United States Environmental Protection Agency
Region 10
1200 Sixth Avenue Suite 900
Seattle, Washington 98101-3140

Authorization to Discharge Under the National Pollutant Discharge Elimination System

In compliance with the provisions of the Clean Water Act, 33 U.S.C. §1251 *et seq.*, as amended by the Water Quality Act of 1987, P.L. 100-4, the "Act",

City of Sandpoint
Wastewater Treatment Plant
723 South Ella Ave
Sandpoint, ID 83864

is authorized to discharge from the wastewater treatment plant located in Sandpoint, Idaho, at the following location(s):

Outfall	Receiving Water	Latitude	Longitude
001	Pend Oreille River	48° 15' 40.5"	116° 33' 31"

in accordance with discharge point(s), effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective December 1, 2017

This permit and the authorization to discharge shall expire at midnight, November 30, 2022.

The permittee shall reapply for a permit reissuance on or before June 3, 2022 if the permittee intends to continue operations and discharges at the facility beyond the term of this permit.

Signed this 5th day of September 2017.

/s/
Michael J. Lidgard, Acting Director
Office of Water and Watersheds

Re-proposal signed this _____ day of __________ 2018.

Draft Permit
Daniel D. Opalski, Director
Office of Water and Watersheds

Draft permit. This document does not authorize a discharge.

Schedule of Submissions

The following is a summary of some of the items the permittee must complete and/or submit to EPA during the term of this permit:

Item	Due Date
1. Discharge Monitoring Reports (DMR)	DMRs are due monthly and must be submitted on or before the 20th day of the month following the monitoring month (see III.B).
2. Quality Assurance Plan (QAP)	The permittee must provide EPA and IDEQ with written notification that the Plan has been developed and implemented by May 31, 2018 (see II.C). The Plan must be kept on site and made available to EPA and IDEQ upon request.
3. Operation and Maintenance (O&M) Plan	The permittee must provide EPA and IDEQ with written notification that the Plan has been developed and implemented by May 31, 2018 (see II.B). The Plan must be kept on site and made available to EPA and IDEQ upon request.
4. NPDES Application Renewal	The application must be submitted by June 3, 2022 (see V.B).
5. Surface Water Monitoring Report	The permittee must submit all surface water monitoring results for the previous calendar year for all parameters in an annual report to EPA and IDEQ by January 31st of the following year (see I.D).
6. Twenty-Four Hour Notice of Noncompliance Reporting	The permittee must report certain occurrences of noncompliance by telephone within 24 hours from the time the permittee becomes aware of the circumstances. (See III.G. and I.B.2.)
7. Local Limits Evaluation	By November 30, 2018, the permittee must submit to EPA a complete local limits evaluation pursuant to 40 CFR 403.5(c)(1). (See II.A.5.)
8. Annual Pretreatment Report	The Report must be submitted to the pretreatment coordinator no later than October 1st of each calendar year. (See II.A.9.)
9. Emergency Response and Public Notification Plan	The permittee must develop and implement an overflow emergency response and public notification plan. The permittee must submit written notice to EPA and IDEQ that the plan has been developed and implemented by May 31, 2018 (see II.E).
10. Mercury Minimization Plan	Written notice must be submitted to the EPA and the IDEQ that the plan has been developed and implemented by May 31, 2018 (see I.E.1).
11. Methylmercury Fish Tissue Monitoring Plan	The permittee must develop and submit a Methylmercury Fish Tissue Monitoring Plan to the Director of the Office of Water and Watersheds and the IDEQ for review and approval by November 30, 2018. (See I.E.2).

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Draft permit. This document does not authorize a discharge.

I. Limitations and Monitoring Requirements

A. Discharge Authorization

During the effective period of this permit, the permittee is authorized to discharge pollutants from the outfalls specified herein to the Pend Oreille River, within the limits and subject to the conditions set forth herein. This permit authorizes the discharge of only those pollutants resulting from facility processes, waste streams, and operations that have been clearly identified in the permit application process.

B. Effluent Limitations and Monitoring

1. The permittee must limit and monitor discharges from outfall 001 as specified in Table 1, below. All figures represent maximum effluent limits unless otherwise indicated. The permittee must comply with the effluent limits in the tables at all times unless otherwise indicated, regardless of the frequency of monitoring or reporting required by other provisions of this permit.

Table 1: Effluent Limitations and Monitoring Requirements

Parameter	Units	Effluent Limitations			Monitoring Requirements		
		Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Sample Location	Sample Frequency	Sample Type
Flow	mgd	Report	—	Report	Effluent	continuous	recording
Temperature	°C	See Notes 10 and 11.			Effluent	continuous	recording
Biochemical Oxygen Demand (BOD_5)	mg/L	30	45	—	Influent and Effluent	3/week	24-hr. comp.
	lb/day	1251	1877	—			calculation
	% removal	85% (minimum)	—	—	% removal	1/month	calculation
Total Suspended Solids (TSS)	mg/L	30	45	—	Influent and Effluent	3/week	24-hr. comp.
	lb/day	1251	1877	—			calculation
	% removal	85% (minimum)	—	—	% removal	1/month	calculation
pH	s.u.	6.5 – 9.0 at all times			Effluent	daily	grab
E. Coli Bacteria[1,2]	#/100 ml	126 (geometric mean)	—	406 (instantaneous max.)	Effluent	10/month	grab
Total Residual Chlorine[2]	mg/L	0.348	—	0.912	Effluent	daily	grab
	lb/day	14.5	—	38.0			calculation
Mercury, Total[2,4]	µg/L	0.56	—	1.1	Effluent	1/month	24-hr. comp.
	lb/day	0.014	—	0.028			calculation
	µg/L	Report	—	Report	Influent	2/year[3]	24-hr. comp.
Phosphorus, Total as P June – September (Interim)	µg/L	Report	Report	—	Effluent	2/week	24-hr. comp.
	lb/day	96	125	—			calculation
Phosphorus, Total as P June – September[9] (Final)	µg/L	Report	Report	—	Effluent	2/week	24-hr. comp.
	lb/day	61	79	—			calculation
Phosphorus, Total as P October – May	µg/L	Report	Report	—	Effluent	2/week	24-hr. comp.
	lb/day	96	125	—			calculation
Ammonia, Total as N	mg/L	Report	—	Report	Effluent	1/month	24-hr. comp.
Nitrate + Nitrite	mg/L	Report	—	Report	Effluent	1/quarter[5]	24-hr. comp.
Total Kjeldahl Nitrogen	mg/L	Report	—	Report	Effluent	1/quarter[5]	24-hr. comp.
Soluble Reactive Phosphorus as P	mg/L	Report	—	Report	Effluent	1/month	24-hr. comp.

Table 1: Effluent Limitations and Monitoring Requirements

Parameter	Units	Effluent Limitations			Monitoring Requirements		
		Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Sample Location	Sample Frequency	Sample Type
Arsenic	µg/L	Report	—	Report	Influent & effluent	2/year[3]	24-hr. comp.
Cadmium, Total Recoverable	µg/L	Report	—	Report	Influent & effluent	2/year[3]	24-hr. comp.
Chromium, Total	µg/L	Report	—	Report	Influent & effluent	2/year[3]	24-hr. comp.
Chromium VI, Dissolved	µg/L	Report	—	Report	Influent & effluent	2/year[3]	24-hr. comp.
Conductivity	µmhos/cm	Report	—	Report	Effluent	1/month[8]	24-hr. comp.
Copper, Total Recoverable	µg/L	Report	—	Report	Influent & effluent	2/year[3]	24-hr. comp.
Cyanide, weak acid dissociable	µg/L	Report	—	Report	Influent & effluent	2/year[3]	See I.B.10.
Dissolved organic carbon	mg/L	Report	—	Report	Effluent	1/month[8]	24-hr. comp.
Hardness, total	mg/L as $CaCO_3$	Report	—	Report	Effluent	1/month[8]	24-hr. comp.
Lead, Total Recoverable	µg/L	Report	—	Report	Influent & effluent	2/year[3]	24-hr. comp.
Nickel, Total Recoverable	µg/L	Report	—	Report	Influent & effluent	2/year[3]	24-hr. comp.
Silver, Total Recoverable	µg/L	Report	—	Report	Influent & effluent	2/year[3]	24-hr. comp.
Zinc, Total Recoverable	µg/L	Report	—	Report	Influent & effluent	2/year[3]	24-hr. comp.
Polychlorinated Biphenyl (PCB) Congeners[6]	pg/L	Report	—	Report	Influent & effluent	2/year	24-hr. comp.
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)[7]	pg/L	Report	—	Report	Influent & effluent	2/year	24-hr. comp.
Whole Effluent Toxicity, Chronic	TU_c	See I.C.			Effluent	See I.C.	24-hr. comp.
NPDES Application Form 2A Expanded Effluent Testing	—	See I.B.9.			Effluent	3x/5 years	—

Draft permit. This document does not authorize a discharge.

Table 1: Effluent Limitations and Monitoring Requirements							
		Effluent Limitations			Monitoring Requirements		
Parameter	Units	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Sample Location	Sample Frequency	Sample Type
1. The average monthly E. Coli bacteria counts must not exceed a geometric mean of 126/100 ml based on samples taken every 3-7 days within a calendar month. See Part VI for a definition of geometric mean. 2. Reporting is required within 24 hours of a maximum daily limit or instantaneous maximum limit violation. See Parts I.B.2. and III.G. 3. See I.B.11. 4. The permittee must use an analytical method that can achieve a maximum ML less than or equal to that specified in Appendix A: Minimum Levels. 5. Quarters are defined as January – March, April – June, July – September, and October – December. 6. See I.B.12. 7. See I.B.13. 8. Samples for dissolved organic carbon, pH, hardness, and conductivity must be collected on the same day. 9. These effluent limits are subject to a compliance schedule. See II.F. 10. Temperature data must be recorded using micro-recording temperature devices known as thermistors. Set the recording device to record at one-hour intervals. Report the following temperature monitoring data on the DMR: monthly instantaneous maximum, maximum daily average, seven-day running average of the daily instantaneous maximum. 11. Use the temperature device manufacturer's software to generate (export) an Excel text or electronic ASCII text file. The file must be submitted annually to IDEQ by January 31 for the previous monitoring year along with the placement log. The placement logs should include the following information for both thermistor deployment and retrieval: date, time, temperature device manufacturer ID, location, depth, whether it measured air or water temperature, and any other details that may explain data anomalies.							

2. The permittee must report within 24 hours any violation of the maximum daily limits or instantaneous maximum limits for the following pollutants: E. coli, total residual chlorine, and mercury. Violations of all other effluent limits are to be reported at the time that discharge monitoring reports are submitted (See III.B. and III.H.).

3. The permittee must not discharge floating, suspended, or submerged matter of any kind in amounts causing nuisance or objectionable conditions or that may impair designated beneficial uses of the receiving water.

4. Removal Requirements for BOD_5 and TSS: The monthly average effluent concentration must not exceed 15 percent of the monthly average influent concentration. Percent removal of BOD_5 and TSS must be reported on the Discharge Monitoring Reports (DMRs). For each parameter, the monthly average percent removal must be calculated from the arithmetic mean of the influent values and the arithmetic mean of the effluent values for that month. Influent and effluent samples must be taken over approximately the same time period.

5. The permittee must collect effluent samples from the effluent stream after the last treatment unit prior to discharge into the receiving waters.

6. For all effluent monitoring, the permittee must use sufficiently sensitive analytical methods which meet the following:

   a) Parameters with an effluent limit. The method must achieve a minimum level (ML) less than the effluent limitation unless otherwise specified in *Table 1 Effluent Limitations and Monitoring Requirements*.

   b) Parameters that do not have effluent limitations.

United States
Environmental Protection
Agency
1200 6th Avenue
Suite 900 M/S OWW-130
Seattle, WA 98101

Fact Sheet

The U.S. Environmental Protection Agency (EPA)
Proposes to Reissue a National Pollutant Discharge Elimination System (NPDES) Permit to Discharge Pollutants Pursuant to the Provisions of the Clean Water Act (CWA) to:

Kootenai-Ponderay Sewer District
Wastewater Treatment Plant

Public Comment Start Date: June 9, 2017
Public Comment Expiration Date: July 10, 2017

Technical Contact: Brian Nickel
206-553-6251
800-424-4372, ext. 6251 (within Alaska, Idaho, Oregon and Washington)
Nickel.Brian@epa.gov

The EPA Proposes to Reissue NPDES Permit

The EPA proposes to reissue the NPDES permit for the facility referenced above. The draft permit places conditions on the discharge of pollutants from the wastewater treatment plant to waters of the United States. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from the facility.

This Fact Sheet includes:

- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations and other conditions for the facility
- a map and description of the discharge location
- technical material supporting the conditions in the permit

State Certification

The EPA is requesting that the Idaho Department of Environmental Quality (IDEQ) certify the NPDES permit for this facility, under Section 401 of the Clean Water Act. Comments regarding the certification should be directed to:

Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422

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B. Compliance History

From 2011 – 2016, the KPSD has generally been in compliance with the effluent limits in the 2002 permit, with the following exceptions shown in Table 1, below.

Table 1: Effluent Limit Violations January 2011 – June 2016

Parameter	Statistic	Units	Number of Instances
E. coli	Instantaneous maximum	#/100 ml	2

III. Receiving Water

This facility discharges to an unnamed tributary to Boyer Slough near Sandpoint, Idaho. The outfall is located about 0.6 mile upstream (north) of Lake Pend Oreille.

A. Low Flow Conditions

The low flow conditions of a water body are used to assess the need for and develop water quality based effluent limits (see Appendix C of this fact sheet for additional information on flows).

The EPA used ambient flow data measured by the permittee, as a condition of the prior permit (see the 2002 permit at Page 5), to estimate the critical low flow conditions for the unnamed tributary to Boyer Slough, upstream from the point of discharge. The estimated 1Q10, 7Q10, 30Q5, and harmonic mean flows of the unnamed tributary to Boyer Slough, upstream from the point of discharge, are 0.12, 0.16, 0.17, and 0.34 CFS, respectively.

Between 1988 and 1993, the USGS operated a stream gauge (station # 12392660) on Sand Creek, which is another tributary to Lake Pend Oreille, located to the west of Boyer Slough. Since flow data are not available for the main stem of Boyer Slough, the EPA estimated the 30B3 flow rate of Boyer Slough (as opposed to the unnamed tributary that receives the discharge) based on the measured 30B3 flow rate of Sand Creek and the drainage areas of Sand Creek (at the stream gauge location) and Boyer Slough. The estimated 30B3 flow rate of Boyer Slough is 0.76 CFS.

B. Water Quality Standards

Overview

Section 301(b)(1)(C) of the Clean Water Act (CWA) requires the development of limitations in permits necessary to meet water quality standards. Federal regulations at 40 CFR 122.4(d) require that the conditions in NPDES permits ensure compliance with the water quality standards of all affected States. A State's water quality standards are composed of use classifications, numeric and/or narrative water quality criteria and an anti-degradation policy.

The use classification system designates the beneficial uses that each water body is expected to achieve, such as drinking water supply, contact recreation, and aquatic life. The numeric and narrative water quality criteria are the criteria deemed necessary by the State to support the beneficial use classification of each water body. The anti-degradation policy represents a three-tiered approach to maintain and protect various levels of water quality and uses.

Monitoring Reports (DMRs). For each parameter, the monthly average percent removal must be calculated from the arithmetic mean of the influent values and the arithmetic mean of the effluent values for that month. Influent and effluent samples must be taken over approximately the same time period.

Table 2 below presents the proposed effluent limits for BOD_5, TSS, *E. coli*, chlorine, ammonia, nitrate + nitrite, and total phosphorus.

Table 2: Proposed Final Effluent Limits

Parameter	Units	Effluent Limits		
		Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit
Five-Day Biochemical Oxygen Demand (BOD_5)	mg/L	30	45	—
	lb/day	86	129	—
	% removal	85% (min.)	—	—
Total Suspended Solids (TSS)	mg/L	30	45	—
	lb/day	100	150	—
	% removal	85% (min.)	—	—
E. coli	#/100 ml	126 (geometric mean)	—	406 (instantaneous maximum)
Total Residual Chlorine	µg/L	9.6	—	19
	lb/day	0.032	—	0.063
Nitrate + Nitrite (as N)	mg/L	21.5	64.0	—
	lb/day	71.7	214	—
Total Ammonia (as N) (October – May)	mg/L	1.71	—	4.85
	lb/day	5.70	—	16.2
Total Ammonia (as N) (June – September)	mg/L	1.64	—	4.66
	lb/day	5.47	—	15.5
Total Phosphorus (as P) (June – September)	µg/L	9.0	18.0	—
	lb/day	0.030	0.060	—

C. Schedules of Compliance and Interim Limits

Schedules of compliance are authorized by federal NPDES regulations at 40 CFR 122.47 and by Section 400.03 of the Idaho Water Quality Standards. The Idaho water quality standards allow for compliance schedules "when new limitations are in the permit for the first time." The proposed effluent limits for ammonia, nitrate + nitrite, and total phosphorus are new limits that are in the permit for the first time.

The federal regulation allows schedules of compliance "when appropriate," and requires that such schedules require compliance as soon as possible. When the compliance schedule is longer than 1 year, federal regulations require that the schedule shall set forth interim requirements and the dates for their achievement. The time between the interim dates shall generally not exceed 1 year, and when the time necessary to complete any interim requirement is more than one year, the schedule shall require reports on progress toward completion of these interim requirements. Federal regulations also require that interim effluent limits be at least as stringent as the final limits in the previous permit (40 CFR 122.44(l)(1)).

The permit also requires the permittee to perform effluent monitoring required by part B.6 of the NPDES Form 2A application[1], so that these data will be available when the permittee applies for a renewal of its NPDES permit. The required monitoring frequency for those pollutants listed in part B.6 of the application form, which are not subject to effluent limits (total Kjeldahl nitrogen, total dissolved solids, and oil and grease), is twice per year. This monitoring frequency will ensure that there are at least 10 results for these pollutants at the end of the permit cycle. If there are less than 10 data points available, the uncertainty is too large to calculate an average or a standard deviation with sufficient confidence (see the TSD at Page 53).

Table 3, below, presents the proposed effluent monitoring requirements for the KPSD WWTP. The sampling location must be after the last treatment unit and prior to discharge to the receiving water. The samples must be representative of the volume and nature of the monitored discharge. If no discharge occurs during the reporting period, "no discharge" shall be reported on the DMR.

Table 3: Effluent Monitoring Requirements

Parameter	Units	Sample Location	Sample Frequency	Sample Type
Flow	mgd	Effluent	Continuous	recording
Temperature	°C	Effluent	Continuous	recording
BOD_5	mg/L	Influent & Effluent	2/month	24-hour composite
	lb/day			calculation[1]
	% Removal	% Removal	1/month	calculation[2]
TSS	mg/L	Influent & Effluent	2/month	24-hour composite
	lb/day			calculation[1]
	% Removal	% Removal	1/month	calculation[2]
pH	standard units	Effluent	5/week	grab
E. Coli	#/100 ml	Effluent	5/month	grab
Total Residual Chlorine	μg/L	Effluent	5/week	grab
	lb/day	Effluent		calculation[1]
Total Ammonia as N (October – May until 10 years after the effective date of the final permit)	mg/L	Effluent	1/month	24-hour composite
Total Ammonia as N (June – September until 10 years after the effective date of the final permit)	mg/L	Effluent	1/week	24-hour composite
	lb/month	Effluent		calculation[1]
Total Ammonia as N (Year-Round beginning 10 years after the effective date of the final permit)	mg/L	Effluent	1/week	24-hour composite
	lb/day	Effluent		calculation[1]
Nitrate + Nitrite as N	mg/L	Effluent	1/week	24-hour composite
	lb/day	Effluent		calculation[1]
Total Phosphorus as P (October – May)	mg/L	Effluent	1/month	24-hour composite
Total Phosphorus as P (June – September until 10 years after the effective date of the final permit)	mg/L	Effluent	1/week	24-hour composite
	lb/month	Effluent		calculation[1]

[1] See also Appendix J to 40 CFR 122.

The permit also requires the permittee to perform effluent monitoring required by part B.6 of the NPDES Form 2A application[1], so that these data will be available when the permittee applies for a renewal of its NPDES permit. The required monitoring frequency for those pollutants listed in part B.6 of the application form, which are not subject to effluent limits (total Kjeldahl nitrogen, total dissolved solids, and oil and grease), is twice per year. This monitoring frequency will ensure that there are at least 10 results for these pollutants at the end of the permit cycle. If there are less than 10 data points available, the uncertainty is too large to calculate an average or a standard deviation with sufficient confidence (see the TSD at Page 53).

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Table 3: Effluent Monitoring Requirements

Parameter	Units	Sample Location	Sample Frequency	Sample Type
Flow	mgd	Effluent	Continuous	recording
Temperature	°C	Effluent	Continuous	recording
BOD_5	mg/L	Influent & Effluent	2/month	24-hour composite
	lb/day			calculation[1]
	% Removal	% Removal	1/month	calculation[2]
TSS	mg/L	Influent & Effluent	2/month	24-hour composite
	lb/day			calculation[1]
	% Removal	% Removal	1/month	calculation[2]
pH	standard units	Effluent	5/week	grab
E. Coli	#/100 ml	Effluent	5/month	grab
Total Residual Chlorine	µg/L	Effluent	5/week	grab
	lb/day	Effluent		calculation[1]
Total Ammonia as N (October – May until 10 years after the effective date of the final permit)	mg/L	Effluent	1/month	24-hour composite
Total Ammonia as N (June – September until 10 years after the effective date of the final permit)	mg/L	Effluent	1/week	24-hour composite
	lb/month	Effluent		calculation[1]
Total Ammonia as N (Year-Round beginning 10 years after the effective date of the final permit)	mg/L	Effluent	1/week	24-hour composite
	lb/day	Effluent		calculation[1]
Nitrate + Nitrite as N	mg/L	Effluent	1/week	24-hour composite
	lb/day	Effluent		calculation[1]
Total Phosphorus as P (October – May)	mg/L	Effluent	1/month	24-hour composite
Total Phosphorus as P (June – September until 10 years after the effective date of the final permit)	mg/L	Effluent	1/week	24-hour composite
	lb/month	Effluent		calculation[1]

[1] See also Appendix J to 40 CFR 122.

Table 3: Effluent Monitoring Requirements				
Parameter	**Units**	**Sample Location**	**Sample Frequency**	**Sample Type**
Total Phosphorus as P (June – September beginning 10 years after the effective date of the final permit)	mg/L	Effluent	1/week	24-hour composite
	lb/day	Effluent		calculation[1]
Dissolved Oxygen	mg/L	Effluent	1/month	grab
Total Kjeldahl Nitrogen	mg/L	Effluent	2/year	24-hour composite
Oil and Grease	mg/L	Effluent	2/year	24-hour composite
Total Dissolved Solids	mg/L	Effluent	2/year	24-hour composite
Total Mercury	μg/L	Effluent	1/quarter[3]	24-hour composite

Notes:
1. Loading is calculated by multiplying the concentration in mg/L by the flow in mgd and a conversion factor of 8.34. If the concentration is measured in μg/L, the conversion factor is 0.00834.
2. Percent removal is calculated using the following equation: (average monthly influent – average monthly effluent) ÷ average monthly influent.
3. Effluent monitoring for mercury is required for the final three full calendar years of the permit cycle.

Monitoring Changes from the Previous Permit

Monitoring frequencies for certain parameters have been reduced, relative to the previous permit. The reductions in monitoring frequency are based on the EPA's *Interim Guidance for Performance-based Reduction of NPDES Permit Monitoring Frequencies* (April 19, 1996). Table 4, below, summarizes the reductions in monitoring frequency that were made based on the guidance.

Table 4: Reductions in Monitoring Frequency			
Parameter	**Ratio of Long Term Average Discharge to Avg. Monthly Limit**	**2002 Permit Monitoring Frequency**	**Reduced Monitoring Frequency**
BOD_5	38%	1/week	2/month
TSS	32%	1/week	2/month

Monitoring frequencies for ammonia, nitrate + nitrite, and total phosphorus have been increased relative to the 2002 permit, in order to determine compliance with the new water quality-based effluent limits for those parameters. Since a compliance schedule has been authorized for ammonia and total phosphorus, the monitoring frequencies have not been increased relative to the prior permit unless and until there is an effluent limit (either final or interim) in effect.

The prior permit did not require monitoring for dissolved oxygen. Monthly effluent monitoring of dissolved oxygen is proposed in the draft permit to determine if the discharge has the reasonable potential to cause or contribute to nonattainment of Idaho's water quality criteria for dissolved oxygen. Since the receiving water provides little physical dilution of the effluent, the effluent dissolved oxygen concentration is relevant, in addition to the BOD concentration and load. In addition, effluent data for dissolved oxygen are required in order to prepare a complete application.

Effluent monitoring for total mercury is proposed in order to determine if the discharge has the reasonable potential to cause or contribute to the excursions above Idaho's methylmercury fish tissue criterion of 0.3 mg/kg, which have been measured in Lake Pend

Oreille, downstream from the discharge. The required monitoring frequency for mercury is quarterly, for the final three full calendar years of the permit cycle. This monitoring frequency will ensure that there are at least 12 results for mercury at the end of the permit cycle. This will ensure that there will be enough mercury results to calculate an average and a standard deviation with sufficient confidence (see the TSD at Page 53).

The EPA proposes to increase the effluent temperature monitoring frequency from once per month in the prior permit to continuous in the reissued permit. Continuous effluent monitoring for temperature is required in order to determine if the discharge of heat has the reasonable potential to cause or contribute to excursions above water quality standards for temperature. The applicable water quality criteria for temperature are stated as maximum allowable daily average and daily maximum temperatures. Continuous monitoring for temperature will allow for accurate calculation of these statistics for the discharge.

C. Surface Water Monitoring

Table 5 presents the proposed surface water monitoring requirements for the draft permit. Surface water monitoring results must be submitted with the DMRs.

The primary purpose of the proposed surface water monitoring is to determine if additional or more-stringent effluent limits are necessary for dissolved oxygen, biochemical oxygen demand, or temperature, and to determine if phosphorus and/or total nitrogen limits are necessary outside of the June – September season. Surface water monitoring must occur during the final full calendar year of the permit term.

Table 5: Receiving Water Monitoring Requirements

Parameter and Units	Locations	Frequency	Sample Type
Flow (Unnamed arm of Boyer Slough, CFS)	Upstream	1/month	Measure
Flow (Boyer Slough, CFS)	Downstream	1/month	Measure
Dissolved Oxygen (mg/L)	Upstream	1/month	Grab
Dissolved Oxygen (mg/L)	Downstream	Continuous	Recording
Dissolved Oxygen (% saturation)	Downstream	Continuous	Recording
Temperature (°C)	Upstream & Downstream	Continuous	Recording
BOD_5 (mg/L)	Upstream & Downstream	1/month	Grab
Total Phosphorus (μg/L)	Downstream	1/month	Grab
Total Nitrogen (μg/L)	Downstream	1/month	Grab
Water column chlorophyll a (μg/L)	Downstream	1/month	Grab
Periphyton chlorophyll a (mg/m^2)	Downstream	1/month	See note 1
Secchi depth (m)	Downstream	1/month	Measure

Notes:
1. Field sampling procedures for periphyton chlorophyll a must be consistent with Section 6.1.1 of *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers* (EPA 841-B-99-002).

VI. Sludge (Biosolids) Requirements

The EPA Region 10 separates wastewater and sludge permitting. The EPA has authority under the CWA to issue separate sludge-only permits for the purposes of regulating biosolids. The EPA may issue a sludge-only permit to each facility at a later date, as appropriate.

LAKE PEND OREILLE AND PEND OREILLE RIVER

Geographic Response Plan

State of Oregon Department of Environmental Quality

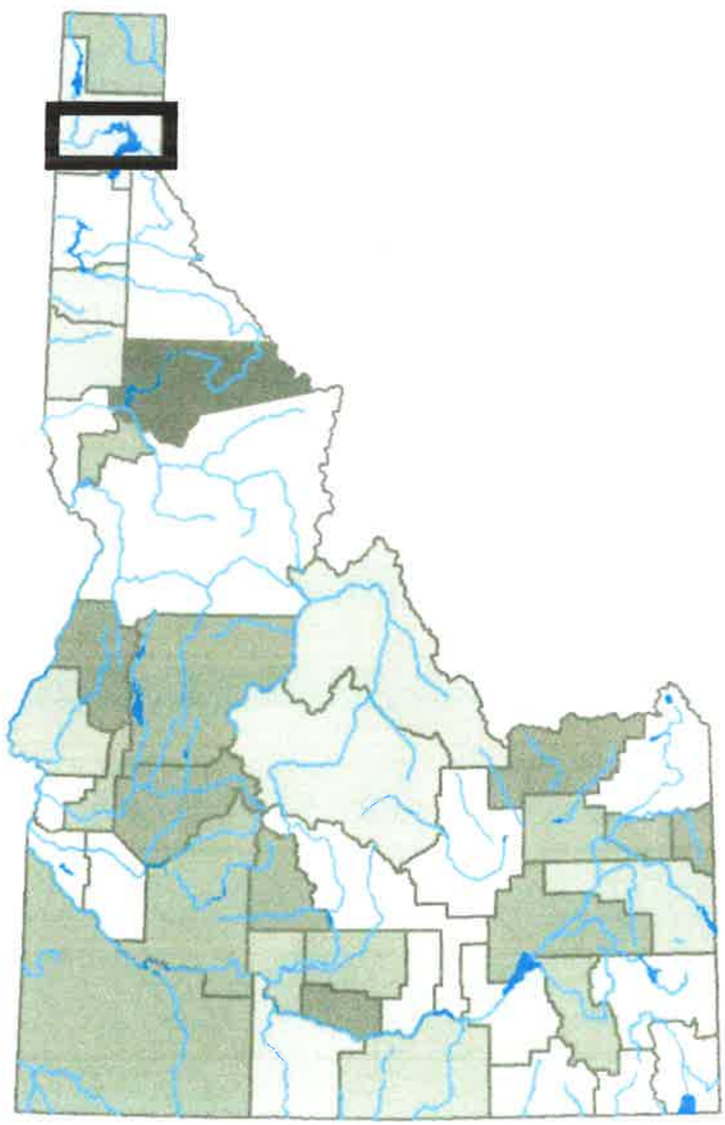
DEPARTMENT OF ECOLOGY State of Washington

Idaho Department of Environmental Quality

United States Environmental Protection Agency

U.S. Coast Guard Sector Columbia River

Sector Puget Sound



This document recommends strategies and priorities for the order in which strategies should be implemented until a unified command is established. However, these recommendations are not a substitute for proper judgement based on current local factors.

> **Protecting human life is always the highest priority—public evacuation should be considered immediately. Control and containment of a spill becomes the next priority, followed by the appropriate response strategy. The information contained in the response strategy descriptions (Appendix B) is recommended guidance, not prescriptive requirements.**

Vulnerabilities

During development of this GRP, challenges beyond the scope of this plan were identified that need further attention. The purpose of this preface is to highlight those concerns and encourage dialogue followed by action to obtain appropriate funding and implementation of the needed changes. State and local civic leaders and managers of the various emergency response agencies are the parties who may be able to address these vulnerabilities. These challenges are current as of June 2017.

Equipment Vulnerabilities

A comparison of the inventory presented in Section 4.6 with the equipment needs stated in the prioritization tables provided in Section 4.4 reveals that, with the exception of the Clark Fork Delta area, the amount of boom and anchor posts available appears adequate for anticipated needs. A full response in the Clark Fork Delta could require as much as 8,300 feet which would consume the entire boom inventory in all five of the local equipment caches. Recovery devices such as skimmers and vacuum trucks are not staged within the Lake Pend Oreille region and would need to be obtained from outside the area. Additionally, conversations with the various fire departments in the Lake Pend Oreille region indicate the equipment trailers do not have an assigned or designated tow vehicle to move the trailer to the appropriate staging area.

Training Vulnerabilities

Like most emergency response tasks, deployment of a spill response boom is a specialized skill that requires training and field practice. Boom deployment in swift moving water or iced-over conditions adds complexity necessitating additional training. The seven fire districts addressed in this plan are largely staffed by volunteers and a smaller number of professionals; they are trained for a variety of emergency scenarios. However, most of the volunteers have not yet received boom deployment training, thus limiting the response to a hazardous material or oil spill into regional waterways.

Evacuation and Procedural Vulnerabilities

The propensity of oil train accidents to erupt into significant spills and fires, coupled with the proximity of rail lines to high population areas, indicate that the Bonner County communities must be prepared to invoke prompt evacuations or provide shelter-in-place assistance. Facilities that are required to have an evacuation plan, such as schools and nursing homes, should also periodically review their plan and conduct appropriate training.

Bonner County has an Evacuation and Reception Plan that was written prior to the large increase in unit oil train traffic (Bonner County, 2010a). Recent lessons learned from either the Cascadia Rising emergency action drill in 2015 or actual oil train accidents in other areas have not been incorporated. As discussed in Section 4.7, an oil train or hazardous material accident in the Sandpoint area would likely require evacuation of half the city's area. Existing preparations do not appear to adequately address the process for a hasty evacuation. Section 4.7 provided details regarding evacuation considerations.

Geographic Vulnerabilities

The Lake Pend Oreille region is vulnerable to spills of hazardous material from highway vehicles and rail cars primarily because the transportation corridors are in close proximity to the rivers and the lake. Additionally, the rail lines and highways pass through or near many high-value wetlands (see Section 6.1.4) and cross over numerous streams and rivers. Of the 37 accidents reported between 1995 and 2014, 21 were at or near a lake, stream, or wetland.

Most notably, the Clark Fork Delta is vulnerable to any spill downstream of the Cabinet Gorge Dam, which is located only 7.5 miles upstream. At a stream velocity of 4.5 miles per hour (mph), a spill could reach the delta in under 2 hours. The nearest equipment cache is located at the Cabinet Gorge Dam. Although response strategies are presented in this plan, their deployment is complex and resource intense. The response may be ineffective. Section 4.3.1 provides recommendations that may enhance response effectiveness.

Section 2 relies heavily on information from the Northwest Power and Conservation Council (NPCC) Intermountain Province Subbasin Plan and Pend Oreille Subbasin Plan (NPCC, 2005a-b).

2.1 General Description of the Natural Environment of the Intermountain Province (IMP)

The IMP, which contains the Pend Oreille Subbasin relevant to the GRP (and five others outside the GRP coverage area), is characterized by a diverse landscape ranging from 1,000 feet (ft) above mean sea level (msl) near the tailwaters of Chief Joseph Dam to 7,690 ft above msl at Illinois Peak in the headwaters of the St. Joe River. The northern and eastern boundaries lie within the Northern Rocky Mountains (NPCC, 2005a). These areas are generally characterized as alpine and subalpine forests with a decaying granitic geology (Alt and Hyndman, 1994). In the eastern portion of the province, in both the Coeur d' Alene and Pend Oreille Subbasins, the Precambrian Belt Supergroup is the predominant bedrock (NPCC, 2005a). Belt rocks are a thick layer of sedimentary sandstones and mudstones, approximately 1 billion years old (Alt, 2001). Much of the southwestern portion of the IMP is within an area known as the Palouse Hills. The Palouse Hills are a softly rounded landscape with rich, fertile, silty soils (NPCC, 2005a). Set within this farmland are areas known as scablands, with outcrops of black basalt, broad expanses of raw gravel, and dry stream channels (coulees) (Alt, 2001). This landscape was carved during the most recent ice age. About 15,000 years ago, the southern glacial fringe encroached upon the mountain valleys of northern Washington and Idaho. Glaciers dammed the Clark Fork River creating Glacial Lake Missoula. The dam broke and the lake drained catastrophically causing a torrential flood (NPCC, 2005a). This process happened several dozen times, resulting in the landscape seen today (Alt, 2001).

2.2 Environmental Conditions within the Pend Oreille Subbasin

Euro-American settlement of the Clark Fork River valley and Lake Pend Oreille was accompanied by forest clearing, agricultural development, logging, introduction of nonnative species, mining, railroad construction, hydroelectric projects, and general urbanization (Entz and Maroney, 2001). Natural and human-made fires, past timber harvest activities, and dams have also heavily influenced the landscape in the Pend Oreille Subbasin (NPCC, 2005b).

In the early and mid-1900s, hydroelectric facilities within the Pend Oreille Subbasin and upstream in the Clark Fork and Flathead drainages were present or under construction (NPCC, 2005b). Facilities in Idaho and Montana—such as the Albeni Falls Dam (inside the GRP coverage area) and Hungry Horse, Kerr, and Noxon Rapids Dams (outside the GRP coverage area)—were built for hydropower, flood protection, fisheries, and recreation (U.S. Senate, 1949).

Large-scale habitat degradation occurred due to operation of Cabinet Gorge, Noxon Rapids, and Albeni Falls Dams. Upstream dams impeded sediment transport to the Clark Fork River Delta, prohibiting development of delta landforms and the protective lakeside beach. Widely fluctuating flows associated with dam operations continued to erode delta shorelines that would naturally be protected by armored streambeds during low fall/winter flows. These and other impacts have resulted in the loss of roughly

50% of functional delta wildlife habitat and ongoing losses estimated at 7.9–11.9 acres per year (NPCC, 2005b).

2.3 Pend Oreille Subbasin Sub-Area Site Description and Physical Features

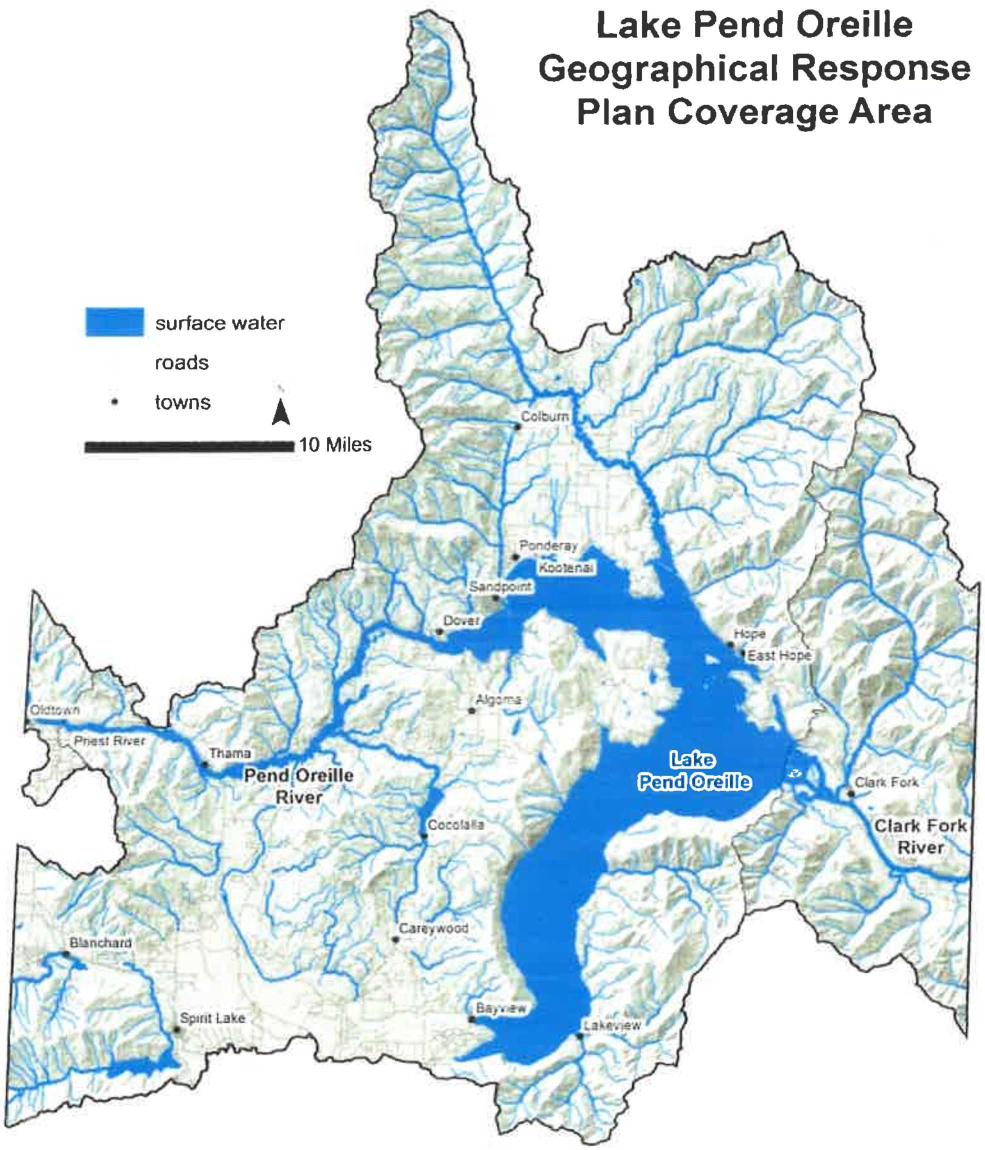
The Pend Oreille Subbasin is located in northern Idaho and northeastern Washington and represents the northeastern-most corner of the IMP. As shown in Figure 2-1, the Pend Oreille Subbasin is comprised of three sub-areas: the Lower Pend Oreille Sub-Area, the Priest Lake Sub-Area, and the Upper Lake Pend Oreille Sub-Area. This GRP addresses only the Upper Lake Pend Oreille Sub-Area, which is shown in greater detail in Figure 2-2. The Upper Pend Oreille Sub-Area encompasses the Cabinet Gorge Dam and all of Lake Pend Oreille and its tributaries located on the Clark Fork River down to Albeni Falls Dam, which is located on the Pend Oreille River.

The Pend Oreille River is the largest river in the subbasin and flows west out of Lake Pend Oreille and north across the Idaho panhandle and the northeastern corner of Washington before draining into the Columbia River in British Columbia, Canada.

Much of the northern and eastern parts of the Pend Oreille River watershed sub-area are public lands comprising mountainous or hilly terrain deeply cut by streams and mostly forested. The broad, fertile valleys and river bottoms, predominately in the western part of the watershed, are mostly in private ownership. Near the lake and on its shore, private lands account for more than half of the ownership. The remaining land is managed by the U.S. Forest Service (USFS) (25%), the state (7%), and the Bureau of Land Management (BLM) (1.6%). Major land uses in the sub-area include agricultural and timber production and recreational development. Only 12% of the drainage is open water.

Lake Pend Oreille's elevation is regulated by Albeni Falls Dam, operated by the U.S. Army Corps of Engineers (USACE). Three major tributaries enter Lake Pend Oreille: the Clark Fork River enters the lake approximately 9.3 miles west of the Idaho-Montana border, the Pack River enters the northeastern portion of the lake, and the Priest River enters the Pend Oreille River about 5 miles upstream of Albeni Falls Dam (this portion of the river is backed up by the dam). Lake Pend Oreille is the fifth-largest natural freshwater lake in the United States.

Figure 2-2: Lake Pend Oreille Geographical Response Plan Coverage Area



2.3.1 Upper Pend Oreille Sub-Area Description

The Upper Pend Oreille Sub-Area is sparsely settled; Bonner County has a population of about 42,500 people. Sandpoint, the county's largest city with about 7,800 residents, and the surrounding cities and rural areas along the northern shore of the lake comprise about half the county's population (U.S.

Census, 2017). In summer, an additional 5,000 people call the northern shore their home (RRT/NWAC, 2005).

The Upper Pend Oreille Sub-area drainage (approximately 1,972 square miles) encompasses all of Lake Pend Oreille and its tributaries, including 9.3 miles of the Clark Fork River upstream to Cabinet Gorge Dam, and the Pend Oreille River and its tributaries down to the lake's control point, Albeni Falls Dam. Lake Pend Oreille is located in the Panhandle region of northern Idaho and lies primarily within Bonner County. Lake elevation is regulated by Albeni Falls Dam. Congressional authorization of Albeni Falls Dam (by the 81st Congress, 1st Session, Senate Document No. 9, February 7, 1949) requires that the Albeni Falls Dam not contribute to downstream flooding. Inflow comes through Cabinet Gorge and Noxon Rapids Dams, which are "power peaking" facilities owned and operated by Avista Utilities. During low flow (non-runoff) season, Avista operates these dams for hourly peaking, but these projects do not affect lake levels (NPCC, 2005b). The USACE operates Albeni Falls Dam, which is located on the Pend Oreille River near the Washington border.

The Pend Oreille River, prior to the construction of Albeni Falls Dam in 1952, provided free-flowing riverine habitat that supported a cold water fishery. Prior to construction of Albeni Falls and Cabinet Gorge Dams, the lower Clark Fork River supported important fisheries for migrating kokanee salmon, mountain whitefish, and bull trout. Westslope cutthroat trout were also present in the river and provided a fishery for fluvial and adfluvial fish (NPCC, 2005b). Today, the upper Pend Oreille River supports a limited warm water fishery, and the presence of salmonids is very low (Bennett and DuPont, 1993). Bennett and DuPont (1993) conducted a 2-year survey (1991 to 1992) and found salmonids (native and nonnative species) accounted for only 1.9% of all species collected in 1991 and 0.6% in 1992. Management direction is to work with USACE on lake level management to improve conditions for fish species (NPCC, 2005b).

Fish habitat in tributary streams within the Upper Pend Oreille Sub-Area has been impaired through delivery of excess bedload sediment, fine sediment delivery, loss of large woody debris and riparian forest habitat, channelization, and isolation of streams from their floodplains (PBTTAT, 1998). Human-made fish migration barriers and water diversions are scattered around the subbasin, resulting in loss of access to spawning and rearing habitat and loss of flow and migrating fish to diversions. During the summer and fall months, the lower 3.4 miles of the Clark Fork River (the headwaters of Lake Pend Oreille) are flooded by backwater from Albeni Falls Dam, creating an unproductive environment for native and introduced salmonids (NPCC, 2005b). Riverine habitat has been further compromised by Cabinet Gorge Dam and its operations, resulting in blocked fish passage, rapidly fluctuating river flows, and during high water years (such as 1997), total dissolved gas levels exceeding 150% saturation (Weitkamp et al., 2003).

Cabinet Gorge Dam presents a complete migration block to fish migrating upstream from the Clark Fork River. Steps are underway to restore fish passage as part of the Federal Energy Regulatory Commission (FERC) re-licensing process (NPCC, 2005b).

northern and eastern aspects. Relatively open stands of Douglas-fir and ponderosa pine are typical on the warmer, dryer southern and western aspects. Representative species of upland shrubs include western serviceberry, *Amelachier alnifolia*; mountain maple; snowberry; mountain balm, *Ceanothus velutinus*; mallow ninebark, *Physocarpus malvaceus*; huckleberry, *Vaccinium* spp.; and others (NPCC, 2005b).

2.4 Hydrology

Lake Pend Oreille is the largest and deepest natural lake in Idaho, covering approximately 83,264 acres prior to impoundment by Albeni Falls Dam in 1952. At full pool, the lake now covers 94,794 acres (USFWS, 1953; Hoelscher, 1993). The lake has more than 175 miles of shoreline and has a mean and maximum depth of 538 ft and 1,151 ft, respectively (Rieman and Falter, 1976). An estimated 95% of the lake's volume is held in the large, southern-most basin, a glacially influenced portion of the Purcell Trench (Savage, 1965) with a mean depth of 715 ft.

The USACE regulates the lake's elevation via operations at Albeni Falls Dam within about 11 ft, between a winter low of 2,051.5 ft above msl and a summer high of 2,062.5 ft above msl. Winter drawdown generally begins after Labor Day. Minimum pool is normally reached between November 15 and December 1, with a target date of November 15 to facilitate kokanee salmon spawning (Fredericks et al., 1995).

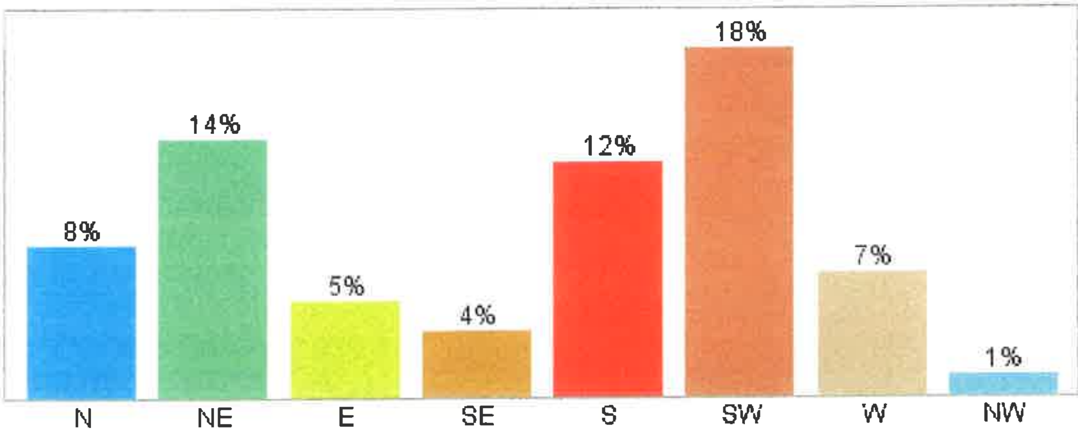
The Clark Fork River is the largest tributary to Lake Pend Oreille and drains a watershed of approximately 22,905 square miles (Lee and Lunetta, 1990). The river contributes approximately 92% of the annual inflow to the lake (Frenzel, 1991) and most of the annual suspended sediment load. Tributaries to the Clark Fork below Cabinet Gorge Dam include Lightning, Twin, Mosquito, and Johnson Creeks. Pack River is the second-largest tributary to the lake and is fed by a number of significant tributary watersheds, including Grouse Creek.

Melting snow produces peak flows in the Clark Fork River typically between 30 and 60 thousand cubic feet per second (cfs) in May or June. Mid-winter rain-on-snow events can result in rapid snowmelt, and in some years the peak flow from tributary watersheds occurs during these events in winter (i.e., the non-runoff season). Lightning Creek and other tributaries draining the Cabinet and Bitterroot Mountains are particularly susceptible to rain-on-snow events due to high precipitation, their location relative to the lake, prevailing winds, and the tendency for warm winter storms to pick up moisture from the lake. The Pend Oreille River is the only surface outflow from Lake Pend Oreille. The reservoir narrows to what was once the natural river channel but is now the forebay of Albeni Falls Dam. Velocities in the channel can be river-like during high flow conditions. The constricted sections of the lake flow for about 27 miles from the lake's northwest corner near Sandpoint into Washington.

2.5 Climate

Continental and marine weather patterns influence climatic conditions in the Upper Pend Oreille Sub-Area. Winter storms pass over the area from November through March causing a noticeably wet climate. Mid-winter storms periodically bring warm air masses resulting in rain-on-snow events at middle elevations ranging between 2,500 and 4,500 ft above msl. Summer storms generally pass farther

Figure 2-3: Sandpoint, Idaho, Wind Directions over the Entire Year



Note: Values do not sum to 100% because the wind direction is undefined when the wind speed is zero.

2.6 Risk Assessment

Numerous transportation and facility-based oil and chemical threats exist in proximity to Lake Pend Oreille. U.S. Highways 2 and 95, State Route 200, and the BNSF Railway/Montana Rail Link (MRL) paralleling Lake Pend Oreille and the Union Pacific (UP) rail line paralleling Pend Oreille River are the primary spill risks. The Cabinet Gorge Dam may also maintain an oil supply for normal operations. Facilities are located on the Clark Fork River approximately 8 miles upstream of Lake Pend Oreille.

2.6.1 Oil and Hazardous Materials Transit in Bonner County

Numerous trains travel through the city of Sandpoint daily and many carry hazardous materials and crude oil. In 2016, three railroads provided commodity transportation information to DEQ. These three railroads combined moved significantly more than 300,000 rail cars or tank cars containing various forms of hazardous materials and crude oil. Currently, approximately 24 unit trains per week carrying crude oil from the Bakken oil fields in the Dakotas and Saskatchewan travel through Sandpoint. As such, the Bakken crude oil trains represent approximately 52.5% of the total number of hazardous material carloads traveling this area. Additionally, butane and alcohols represent about 11.6% of the total hazmat carloads. Table 2-1 and Figure 2-4 summarize the types and quantities of hazardous materials transported through Bonner County.

Table 2-1: Oil and Hazardous Material Rail Shipments in Bonner County (More than 300,000 Total Loads Per Year)

Hazardous Material Rail Shipments in Bonner County per Year (2016)	Hazard Class	% of total
Bakken Crude (UN 1267)	3	52.5%
Flammable Gases	2.1	11.6%
Other Hazard Class 3 & Combustible Liquid	3	21.1%
Hazard Class 9 and other hazardous material	9	14.8%

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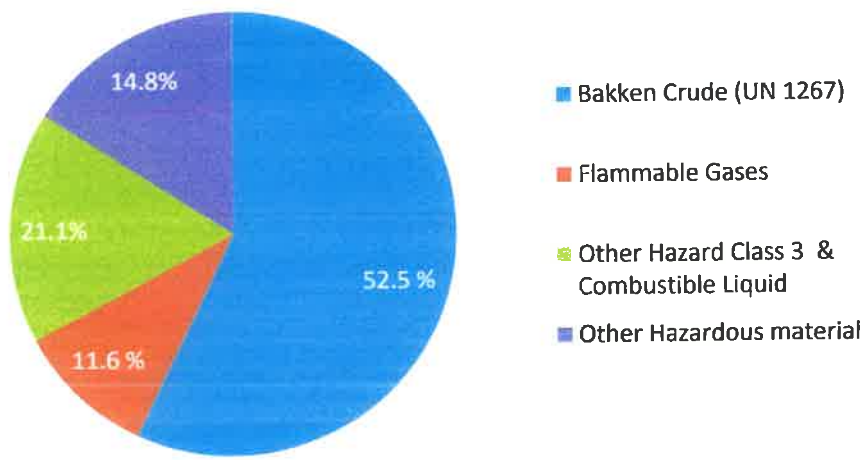
Figure 2-4: Hazardous Material by Rail in Bonner County



Further analysis of the rail commodities reveals that the 20 most frequently shipped commodities comprise 97% of the total number of packages shipped. A review of the most frequently shipped commodities against guidance from the North American Emergency Response Guidebook (US Department of Transportation, 2016) indicates the following:

- All of the top 20 hazardous materials require self-contained breathing apparatus (SCBA) as personal protective equipment, and 5 require SCBA personal protective equipment that is "specifically recommended by the manufacturer."
- 13 of the top 20 are liquid.
- 4 of the top 20 are gaseous.
- 1 of the top 20 is a solid (ammonium nitrate).
- Sulfuric acid and hydrochloric acid represent 1.1% of the total number of hazmat rail shipments. These materials are reactive and may release corrosive, toxic, or combustible gases.
- Aside from the two acids mentioned, all of the top 20 hazmat rail shipments are combustible.
- Evacuation criteria for accidents involving rail cars transporting these hazardous materials range from 0.5 to 1 mile.
- Allyl bromide comprises 2.5% of the total hazmat rail shipments. It has a specific gravity greater than 1 and will sink if spilled into a waterway.
- Alcohol NOS, sulfuric acid, hydrochloric acid, and methanol comprise 12.9% of the total hazmat rail shipments. These items are soluble in water.
- Current response trailers are set up for crude oil releases (see Section 4.6). Collection of other materials may create hazardous and explosive environments.

A considerable amount of hazardous materials is also shipped on the highways of Bonner County. In 2010, a qualitative survey was conducted to assess the amount and type of hazardous materials flowing through the county (Bonner County, 2010c). During two separate 2-hour periods at four different locations, a total of 310 commercial vehicles were observed passing through. Of those vehicles, 35 were observed to be placarded as containing hazardous materials. Table 2-2 lists the relative percentage of the types of materials observed. Not surprisingly, flammable liquid, such as gasoline and diesel fuel, were the largest contributors.

Table 2-2: Hazardous Materials by Highway in Bonner County

Hazard Class	Description	Number observed (for a 16 hour period)	Percentage
2.1	Flammable Gas	13	37.1
3	Flammable Liquid	16	45.7
5.1	Oxidizer	1	2.9
8	Corrosive	3	8.6
9	Class 9 (and Other)	2	5.7
	TOTAL	**35**	**100**

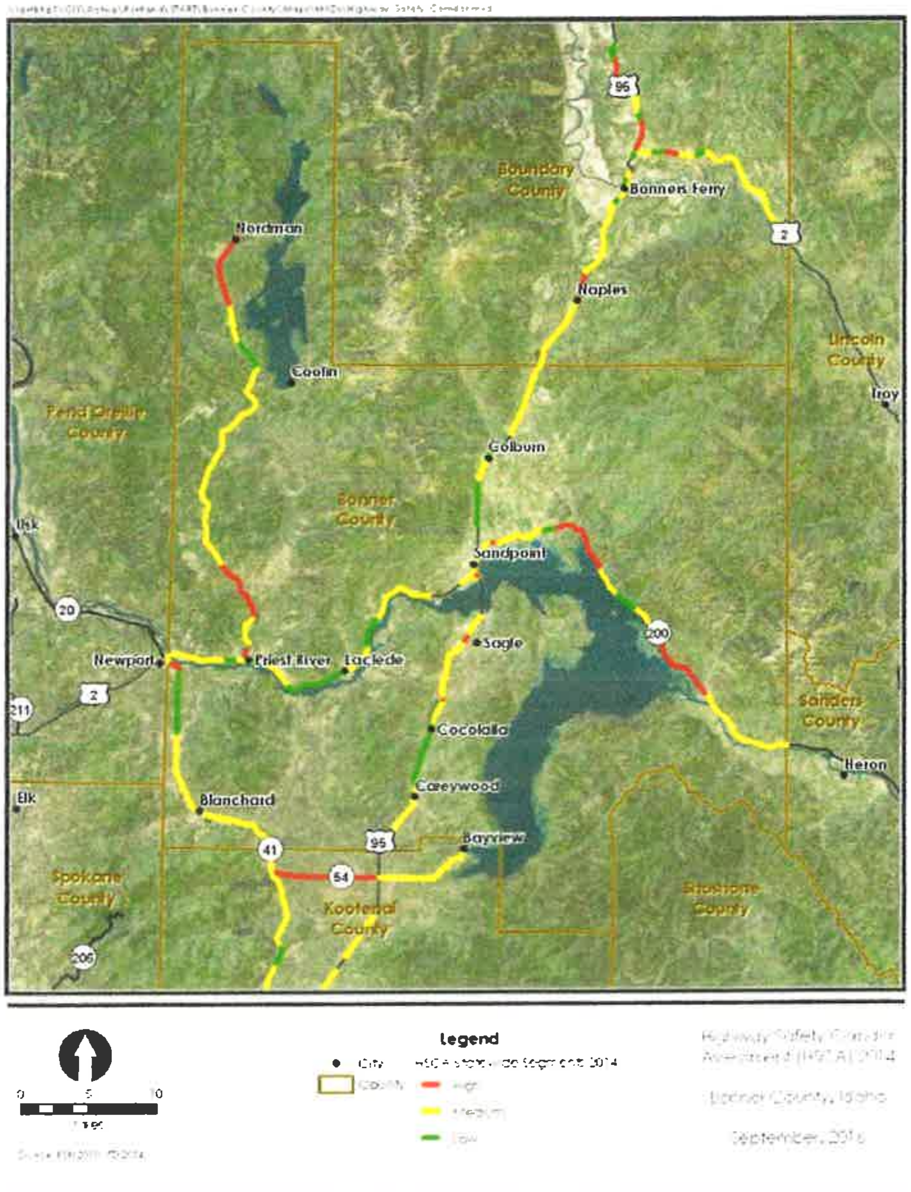
Since the 2010 survey was completed, mining operations in Canada have resulted in numerous truckloads of "ammonium nitrate liquid (hot concentrated solution)" (ID number 2426, Hazard Class 5.1) being transported through Bonner County. This material is very hazardous and may react explosively when heated (Cameo Chemicals, 2017).

The 2010 highway survey and recent observations result in a qualitative assessment because the survey was conducted for a short duration at one particular time of year. Seasonal variations in weather as well as commercial and recreational activities would alter the amount of fuel being delivered to or through the county. Nevertheless, the survey and observations indicate that a wide variety of hazardous materials are being transported by truck through Bonner County.

2.6.2 Roadway

U.S. Highways 2 and 95 and State Route 200 are the primary roadways passing through the GRP coverage area. ITD conducted a highway safety corridor analysis for Bonner County (Figure 2-5). Highway 200 along the north shore of Lake Pend Oreille represents a unique challenge in that accidents are more frequent and the highway runs very close to the lake shore.

Figure 2-5: Highway Accident Safety Corridor Map for Bonner County



2.6.3 Railroads

The topography of Bonner County has been very attractive to the railroad industry over the last one and a half centuries. Figure 2-6 shows the rail lines in Bonner County. The MRL follows the Clark Fork River and the northern shore of Lake Pend Oreille to Sandpoint. The UP railroad runs from Bonners Ferry southwards through Sandpoint and southwest toward Spokane. The UP railroad also shares trackage with the MRL. The BNSF Railway also runs south from Bonners Ferry through Sandpoint but crosses the Pend Oreille River at its junction with the lake; the BNSF line then continues south to the county line where it runs adjacent to the UP railroad before turning west towards Spokane, Washington. The Pend Oreille Valley railroad is a short line railroad operating between Newport, Washington, and Sandpoint, Idaho, along the north side of the Pend Oreille River.

Railroad accidents in Bonner County are common. Between 1995 and 2014, the last date for which data were available, the Federal Railroad Administration reported 37 unique accidents, which includes all accidents from minor mishaps to significant derailments. In the spring of 2017, at least four significant derailments occurred in Bonner and Boundary Counties near waterways. Table 2-3 below summarizes those accidents by rail line. Figure 2-7 and Figure 2-8 show the location of those accidents; the north side of Sandpoint appears to be an area where accidents are more frequent.

Table 2-3: Bonner County Rail Accidents, 1995–2014

Railroad	Number of Accidents
BNSF	13
MRL	8
UP	15
Pend Oreille Valley	1
TOTAL	**37**

In fall 2016, at the request of DEQ, the four railroads provided copies of the public version of their bridge inspection reports. All bridge inspections were current in accordance with the Fixing America's Surface Transportation Act Public Law 114-94. The reports indicated that all bridges passed inspection and were "confirmed to have the capacity to safely carry traffic being operated over the bridge."

Figure 2-6: Bonner County Railroads

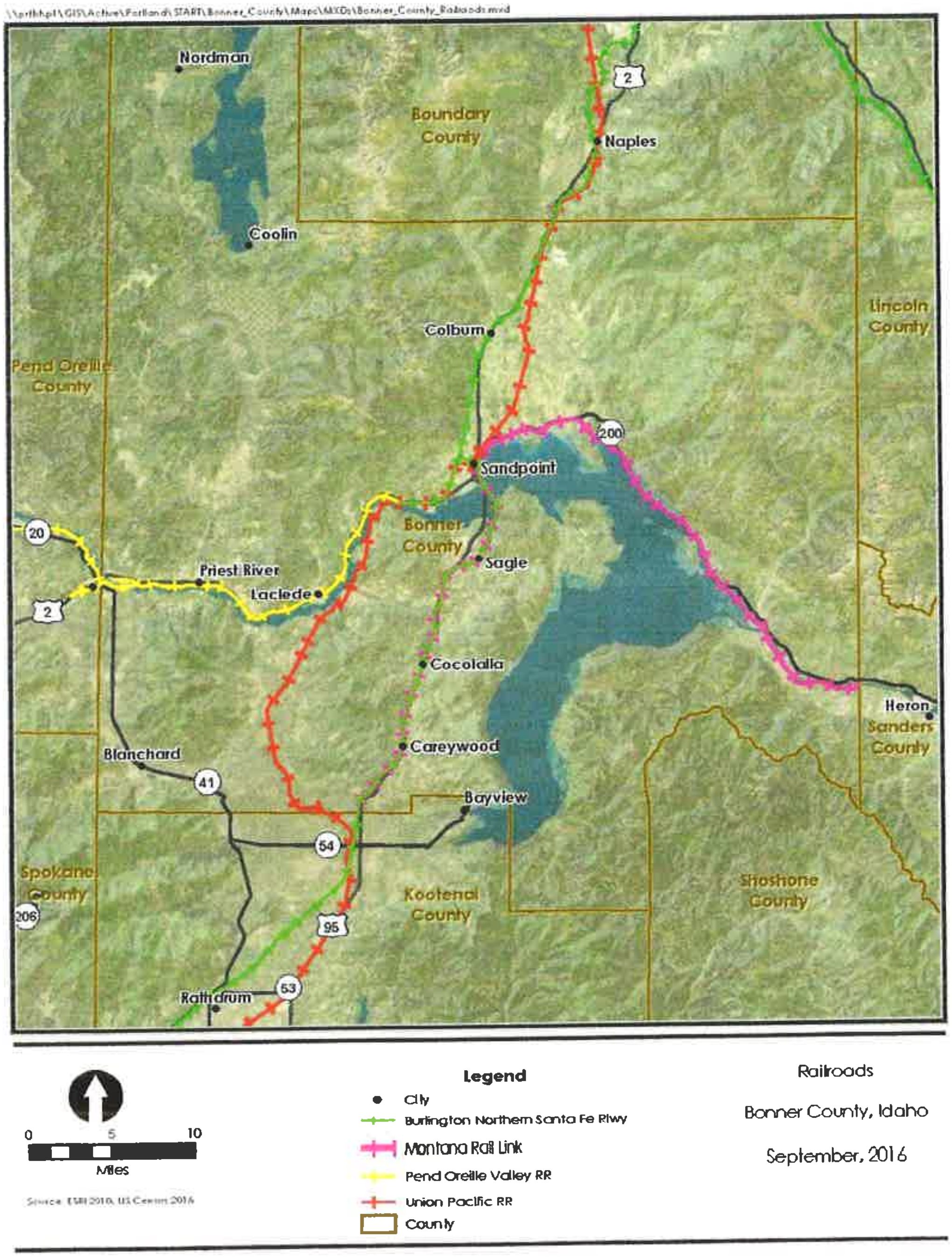


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Figure 2-7: Bonner County Train Accidents (1995–2014)

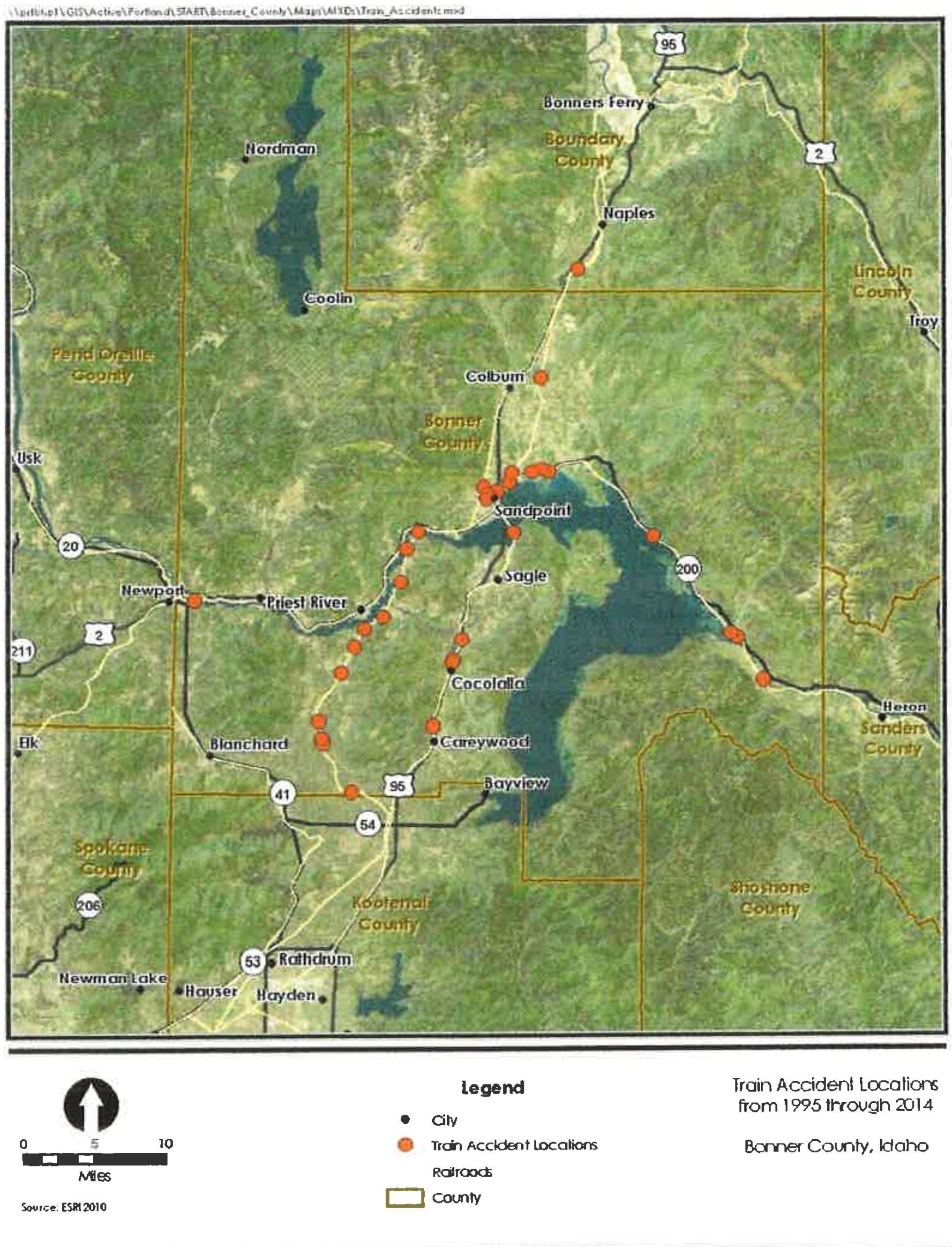

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Figure 2-8: Sandpoint, Idaho, Train Accidents (1995–2014)

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3 Response Options and Considerations

The table provided in this section correlates the type of terrain or other environmental feature with the response sectors. The response sectors are further described in Section 4.3.

	Lake Pend Oreille GRP Spill Response Options and Considerations	Location							
		Sector 1A–1B West Pend Oreille	Sector 2 Westside Fire	Sector 3A–3D Sandpoint	Sector 4A Northside (Lakeshore)	Sector 4B Northside (Selle Valley)	Sector 5 Sam Owens	Sector 6 Clark Fork	Sector 7A–7B Sagle
Waterbody	Rivers	•	•		•	•		•	
	Creeks	•	•	•	•	•	•	•	•
	Lakes			•	•		•		•
	Pool Area formed by Dam							•	
	Wetland Area(s)	•	•	•	•	•	•	•	•
	Intermittent Streams (Seasonal Flow)	•	•	•	•	•	•	•	•
Potential Response Options	Source Control and Containment Activities	•	•	•	•	•	•	•	•
	Aerial/Vessel Surveillance Activities	•	•	•	•	•	•	•	•
	Wildlife Rescue and Rehabilitation Activities	•	•	•	•	•	•	•	•
	Shoreside Collection and Oil Recovery *(Note: 1)*	•	•	•	•	•	•	•	•
	Vessel-Based Skimming Operations *(Note: 2)*	•	•	•	•		•	•	•
	Shore- or Vessel-Based Skimming Operations *(Note: 3)*	•	•	•	•	•	•	•	•
	Shoreline Protection Booming *(Note: 4)*	•	•	•	•	•	•	•	•

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Lake Pend Oreille GRP Spill Response Options and Considerations		Location							
		Sector 1A–1B West Pend Oreille	Sector 2 Westside Fire	Sector 3A–3D Sandpoint	Sector 4A Northside (Lakeshore)	Sector 4B Northside (Selle Valley)	Sector 5 Sam Owens	Sector 6 Clark Fork	Sector 7A–7B Sagle
	Shoreline Cleanup Activities *(Note: 5)*	•	•	•	•	•	•	•	•
	Containment in Ditches or Outfalls (Note: 6)								
	In-Situ Burning ***<u>Area is not pre-approved (Note: 7)</u>***								
Considerations	High Water vs. Low Water Boat Launches	•	•	•	•		•	•	•
	Current – Ability to Boom	•						•	
	Weather Concerns – Freezing Waterway Potential and Safety of Roads	•	•	•	•	•	•	•	•
	Shoreside Access can be Limited by Private Property	•	•	•	•	•	•	•	•
	State or National Wildlife Refuge / Recreation Area	•	•	•	•		•	•	
	Threatened/Endangered Species	•	•	•	•	•	•	•	•
	Public or Commercial Marina(s) in Area		•	•			•		
	Recreational Boat Traffic	•	•	•	•		•	•	•
	Tribal Lands or Usual and Accustom Interests *(Note: 8)*	•	•	•	•	•	•	•	•
	Historic / Cultural District(s) in Area			•			•		
	Dam(s) in Area							•	
	U.S. Highway Corridor		•	•	•	•			•
	Oil Movement by Rail in Area	•	•	•	•	•			•
	Oil Pipeline(s) in Area								

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<u>Note 1</u>: Shoreside Collection and Oil Recovery response options should only happen in locations where skimmers or vacuum trucks can access the collected oil.
<u>Note 2</u>: Vessel-Based Skimming response options should include enhanced skimming using a U-boom, V-boom, or J-boom configuration in waters large enough for boats to maneuver (e.g., lake, large river).
<u>Note 3</u>: Shore-Based Skimming response options should include use of fixed skimmers: weir, belt, brush, drum, or other skimmer types.
<u>Note 4</u>: Shoreline Protection Booming should include deploying response strategies (booms) to divert and collect oil off of the water before shoreline areas are impacted, or deflect and exclude oil away from shoreline areas. These strategies include those published in this document (GRP response strategies), those provided in other plans (e.g., facility contingency plans), and "ad-hoc" strategies developed during the spill itself.
<u>Note 5</u>: Shoreline Cleanup options depend on safe and efficient access to spill locations and the type of river, creek, or stream bank present. Potential activities could include flooding, flushing, manual removal, vacuum, mechanical removal, sorbents, vegetation cutting, mechanical tilling/aeration, and/or sediment reworking/surf washing.
<u>Note 6:</u> A culvert block or underflow dam might be installed to aid in the recovery of spilled oil in small streams or those with intermittent flow. This strategy is used to protect downstream waterbodies such as Lake Pend Oreille and the rivers from upstream releases of oil.
<u>Note 7:</u> These areas are not pre-approved for the use of in-situ burning. Refer to the Northwest Area Contingency Plan for the in-situ burn policy. The use of in-situ burning would require incident approval from EPA, the Department of the Interior, and the National Oceanic and Atmospheric Administration.
<u>Note 8</u>: This sheet doesn't represent all locations where Tribes and Tribal Nations have lands or areas of specific interest (including lands established by treaty or rights to Usual and Accustom areas). Early coordination with tribal governments is highly recommended during a response, regardless of the spill location or potential impact areas.

WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

Verification of 303(d) Listings for Fish Tissue in the Skagit and Pend Oreille Rivers

June 2005
(Revised July 2005)

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Results and Discussion

Skagit River

Results from the Skagit River fish tissue samples are shown in Table 8.

The only chemical to exceed the NTR human health criteria was total PCBs. Over half of the analyzed contaminants were not detected at or above detection limits in any of the fish tissue composite samples. Those that were detected were present at low concentrations.

Detected contaminants included all three DDT analogs, PCB aroclors 1254 and 1260, and dieldrin. Dieldrin was detected in only one composite sample. PCBs were detected in all but one sample. Non-detected chemicals in the Skagit River included bis(2-ethylhexyl)phthalate, alpha-BHC, aldrin, endrin, heptachlor, heptachlor epoxide, and some of the PCB aroclors.

Based on the exceedances of NTR human health criteria, the Skagit River should be placed on the Category 5 303(d) list for total PCBs in fish tissue. The other historical chemical listings – 4,4'-DDE, 4,4'-DDT, alpha-BHC, dieldrin, and bis(2-ethylhexyl) phthalate – for fish tissue should be moved to Category 1 (Meets Tested Standards). Specific 303(d)-listing recommendations for both the Category 2 and 5 fish tissue listings are provided in the *Conclusions and Recommendations* section of this report.

Table 9 gives a comparison between the historical and current 303(d)-listed contaminants in fish tissue composite samples from the Skagit River. Contaminant levels appear to be decreasing overall. Total DDT shows the most dramatic decline with concentrations decreasing by one to two orders of magnitude.

Pend Oreille River

Results from the Pend Oreille River fish tissue samples are shown in Table 10.

The only chemical to exceed the NTR human health criteria was total PCBs. Over half of the analyzed contaminants were not detected at or above detection limits in any of the fish tissue composite samples. Those that were detected were present at low concentrations.

Detected contaminants included all three DDT analogs and PCB aroclors 1254 and 1260. They were detected in all but one sample. Non-detected chemicals in the Pend Oreille River included bis(2-ethylhexyl)phthalate, alpha-BHC, aldrin, endrin, dieldrin, heptachlor, heptachlor epoxide, and some of the PCB aroclors.

Based on the exceedances of NTR human health criteria, the Pend Oreille River should be placed on the Category 5 303(d) list for total PCBs in fish tissue. The historical fish tissue listing for aldrin should be moved to Category 1 (Meets Tested Standards). Recommendations for both the Category 5 fish tissue and Category 2 water column 303(d) listings are provided in the *Conclusions and Recommendations* section of this report.

Comparisons between historical and current study data for the Pend Oreille River were not made due to differences in species and types of fish tissue analyzed.

Comparison to Statewide Data for PCBs and DDT

To give more perspective on the current PCB and DDT concentrations in Skagit River and Pend Oreille River fish, data from the present study were compared to statewide concentrations and are shown in Figures 4 & 5. Each figure is a cumulative frequency plot that displays the distribution of values in the data set as percentiles. The data are plotted on a logarithmic scale.

Data for the figures were compiled from the following Ecology and EPA fish tissue studies: Davis and Johnson, 1994; Davis et al., 1995; Davis and Serdar, 1996; Davis et al., 1998; Ecology, 1995; EPA, 1992; EPA 2002a; EPA 2002b; Hopkins et al., 1985; Hopkins, 1991; Jack and Roose, 2002; Johnson and Norton, 1990; Johnson, 1997; Johnson, 2000; Johnson et al., 2004; Rogowski, 2000; Seiders and Kinney, 2004; Seiders, 1995; Serdar, Johnson, and Davis, 1994; Serdar, Yake, and Cubbage, 1994; Serdar, 1998; Serdar and Davis, 1999; Serdar, 1999; and Serdar 2003.

PCBs

As shown in Figure 4, all results for total PCBs from the Skagit and Pend Oreille rivers fell below the 30th percentile when compared to other statewide values. All but one result (from the Skagit River) still exceeds the NTR human health criterion of 5.3 ug/Kg ww.

DDT

Figure 5 illustrates that results for total DDT from the Skagit and Pend Oreille rivers fell below the 16th percentile, far below the NTR human health criteria of 31.6 and 45 ug/Kg ww for DDT analogs.

Addressing PCBs in a Statewide Context

The Federal Clean Water Act requires the development of a TMDL for Category 5-listed waters. Results from the current study indicate that the Skagit and Pend Oreille rivers should be listed for total PCBs in fish tissue. Total PCB concentrations, however, do not seem high enough to warrant a TMDL study for the Skagit and Pend Oreille rivers. Total PCB concentrations in the Skagit and Pend Oreille rivers are relatively low compared to other areas of Washington State.

An alternative to a river-specific TMDL for the Skagit and Pend Oreille rivers would be to address PCBs by a statewide approach such as a statewide TMDL. Background levels would first need to be established for PCBs. Waterbodies with 303(d) listings for PCBs could then be prioritized statewide.

Results from the Washington State Toxics Monitoring Program show that PCBs were found in 63% of fish tissue samples analyzed, and that more than half of those samples exceeded the NTR human health criteria. The results were from 80 fish tissue samples collected from nearly 50 sites between 2001 and 2004 (Keith Seiders, personal communication).

Conclusions and Recommendations

Skagit River

The only chemical to exceed the NTR human health criteria in Skagit River fish was total PCBs. Over half of the analyzed contaminants were not detected at or above detection limits in any of the fish tissue composite samples. Those that were detected were present at low concentrations. Contaminant levels in the Skagit River fish appear to be decreasing overall. Recommendations for 303(d) listing for the Skagit River are shown in Table 11.

Table 11. Recommended Listing Status for each of the Current 303(d) Listings for Fish Tissue in the Skagit River (Waterbody ID 5V53RP).

River Segment	Listing ID No.	303(d)-Listed Parameter	Matrix	Proposed Listing Category	Recommended Listing Category
North	14032	**4,4'-DDT**	Fish Tissue	**5**	1
"	14034	**4,4'-DDE**	Fish Tissue	**5**	1
"	14035	**Alpha BHC**	Fish Tissue	**5**	1
"	14036	**Total PCBs**	Fish Tissue	**5**	**5**
South	35541	4,4'-DDE	Fish Tissue	2	1
"	35550	Dieldrin	Fish Tissue	2	1
"	35548	Bis(2-ethylhexyl)phthalate	Fish Tissue	2	1
"	35570	**Total PCBs**	Fish Tissue	2	**5**

Bold = Category 5 listings

The Category 5 listings on the 2002/2004 303(d) list for the Skagit River include 4,4'-DDE, 4,4'-DDT, alpha BHC, and total PCBs in fish tissue. Results from the current fish tissue verification study indicate that, with the exception of total PCBs, these contaminants no longer exceed the NTR human health criteria. Alpha BHC, 4,4'-DDE, and 4,4'-DDT should therefore be moved to Category 1 for meeting tested standards. The total PCB listing should be retained in Category 5.

The Category 2 fish tissue listings for 4,4'-DDE, dieldrin, and bis(2-ethylhexyl)phthalate should be moved to Category 1. The Category 2 total PCB listing should be moved to Category 5.

Recommendations for the next steps in addressing PCBs in Skagit River fish include:

1. Fish tissue should be monitored again in five years.
2. Total PCBs should be addressed by a statewide approach such as statewide TMDL.

Pend Oreille River

The only chemical to exceed the NTR human health criteria in Pend Oreille River fish was total PCBs. Over half of the analyzed contaminants were not detected at or above detection limits in any of the fish tissue composite samples. Those that were detected were present at low concentrations. Recommendations for 303(d) listing for the Pend Oreille River are shown in Table 12.

Table 12. Recommended Listing Status for each of the Current 303(d) Listings for Fish Tissue and for the Water Column in the Pend Oreille River (Waterbody ID DS54SI).

River Segment	Listing ID No.	303(d)-Listed Parameter	Matrix	Proposed Listing Category	Recommended Listing Category
North	9077	4,4'-DDT	Water	2	1
"	9078	4,4'-DDE	Water	2	1
"	9079	4,4'-DDD	Water	2	1
"	9072	Endrin	Water	2	1
"	9073	Aldrin	Water	2	1
"	9074	Dieldrin	Water	2	1
"	9075	Heptachlor	Water	2	1
"	9076	Heptachlor Epoxide	Water	2	1
"	*NL*	**Total PCBs**	Fish Tissue	*NL*	**5***
South	9080	**Aldrin**	Fish Tissue	**5**	1
"	*NL*	**Total PCBs**	Fish Tissue	*NL*	**5***

*New listing for the 2002/2004 303(d) list
NL = not currently 303(d) listed
Bold = Category 5 listings

The Category 5 listing on the 2002/2004 303(d) list for the Pend Oreille River is for aldrin in fish tissue. Results from the current fish tissue verification study indicate that the chemical aldrin no longer exceeds the NTR human health criteria and therefore should be moved to Category 1 for meeting tested standards. Results also indicate that total PCBs exceeded NTR criteria in a majority of samples from the north and south river segments. Therefore, total PCBs should be added as Category 5 listings for fish tissue. These will be new listings.

The Category 2 water column listings were addressed through the fish tissue results. By way of the process of biomagnification, it was assumed that contaminants present in the water column would show up in the fish tissue results. The Category 2 water column contaminants are recommended to be moved to Category 1 of the 303(d) list.

Recommendations for the next steps in addressing PCBs in Pend Oreille River fish include:

1. Fish tissue should be monitored again in five years.

2. Total PCBs should be addressed by a statewide approach such as statewide TMDL.

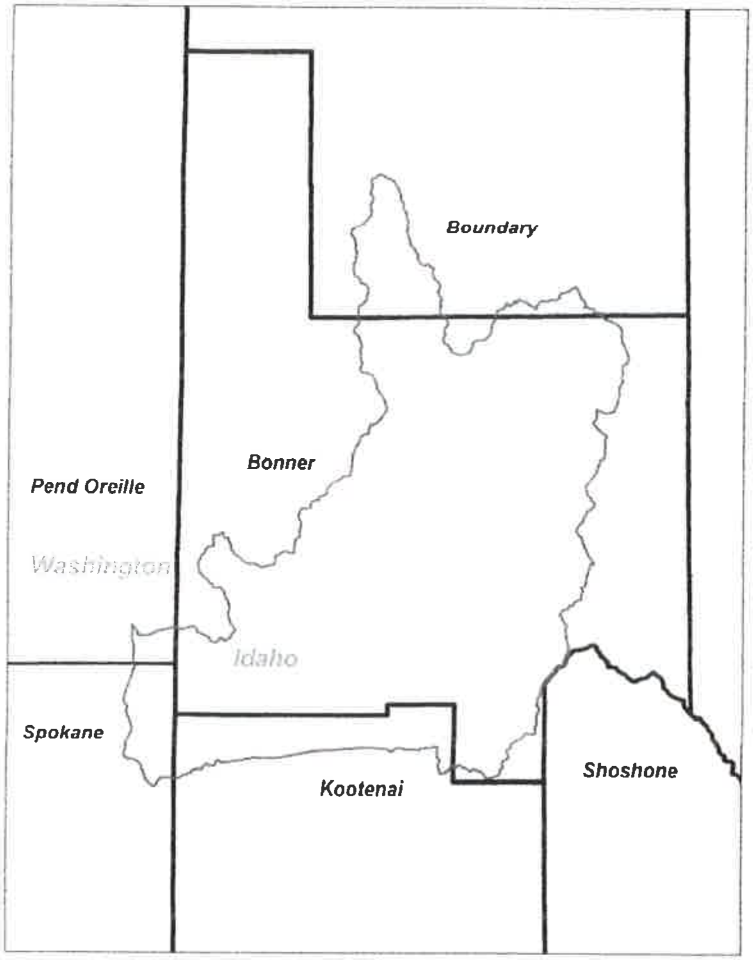
NRCS
Natural Resources Conservation Service

Idaho

Pend Oreille Lake - 17010214

8 Digit Hydrologic Unit Profile

February 2006



Introduction

The Pend Oreille 8-Digit Hydrologic Unit Code (HUC) subbasin contains 780,330 acres. Bonner County accounts for 81 percent of the subbasin. Nine percent of the subbasin is in Kootenai County, six percent in Boundary County, four percent in Spokane County, Washington and less than one percent in Pend Oreille County, Washington. Fifty four percent of the basin is privately owned.

Sixty-six percent of the basin is in forest. Less than one percent is cropland. With the presence of Lake Pend Oreille, 21 percent is water, wetland, developed or barren. Thirteen percent is shrubland, rangeland, grass, pasture or hayland.

Elevations range from 2,000 feet at Lake Pend Oreille to over 7,500 feet in the northern portion of the watershed.

Conservation assistance is provided through five Soil Conservation Districts which include Boundary SCD, Kootenai-Shoshone SCD, Bonner SWCD, Spokane CCD the Pend Oreille CCD, and the Panhandle Lakes Resource Conservation and Development office.

Profile Contents

Resource Concerns - Continued

Impacted Water Bodies [9,10]	Stream Miles	Sediment, Siltation or TSS	Nutrients	Temperature	Dissolved Oxygen	Flow Alteration	Other or Unknown
Cocolalla Lake (PN013_0L)	---		x		x		
Falls Creek (PN018_02a)	---		x				
Pend Oreille Lake* (PN018L_0L)	---		x			x	
Caribou Creek (PN045_02))	17.0	x					
Cedar Creek (PN026_02)	9.5			x			
Chloride Creek (PN024_02))	7.1	x		x			
Cocolalla Creek (PN 012_02, **012_04, PN 014_03, 014_04**)	72.9	x		x*			
Fish Creek (PN 015_02, **015_03**)	17.7	x		x*			
Gold Creek (PN 023_02, 023_03, PN 021_02, 021_03)	14.4	x		x			
Gold Creek (PN034_02)	17.8			x			x
Granite Creek (PN 027_02, 027_03)	31.2			x			
Grouse Creek (PN 035_02, 035_03, PN 036_02, 036_03)	48.1	x		x			
Hellroaring Creek (PN044_02)	10.9			x			x
Hoodoo Creek (PN 003_03, 003_02, 003_02a)	19.2	x		x			
Jeru Creek (PN043_02)	6.3			x			
Lower Pack River (PN031_04)	19.2	x	x				
McCormick Creek (PN042_02)	10.8			x			x
NF Grouse Creek (PN037_02)	17.4	x		x			
NF Gold Creek (PN 025_03, 025_02)	19.4	x					
Pend Oreille River (PN 002_02, 002_03, 002_08)	64.5	x		x		x	x
Pend Oreille River (PN 001_02, 001_08)	13.7	x		x		x	x
Rapid Lightning Creek (PN033_03)	7.8			x			x
Sand Creek (PN048_03)	4.0			x			
Sand Creek (PN 049_02,049_03)	19.4						x
Schweitzer Creek ((PN052_02)	6.7	x					
Trestle Creek (PN030_02)	21.0			x			
Trout Creek (PN032_02)	10.1			x			
Upper Pack River (PN039_04)	3.8	x		x			
Upper Pack River (PN041_02)	56.2			x			x
West Gold Creek (PN022_02)	9.6	x		x			
TOTAL STREAM MILES:	555.7						

*Listing includes several segments; temperature-impaired segments are bolded.
Shading indicates an EPA-approved TMDL. Note: Portions of Pend Oreille Lake have not been assessed.

Pollutant sources in the watershed include hydropower, mining, timber harvest, lakeside development, industrial discharge, and agricultural land use. The majority of listed streams are temperature impaired. Elevated stream temperatures may be due to loss of riparian habitat, stream channel widening, altered flood plain and hyperheic zone hydrology, or other anthropogenic or natural sources. Flow alteration problems exist within the watershed.

Resource Concerns - Continued

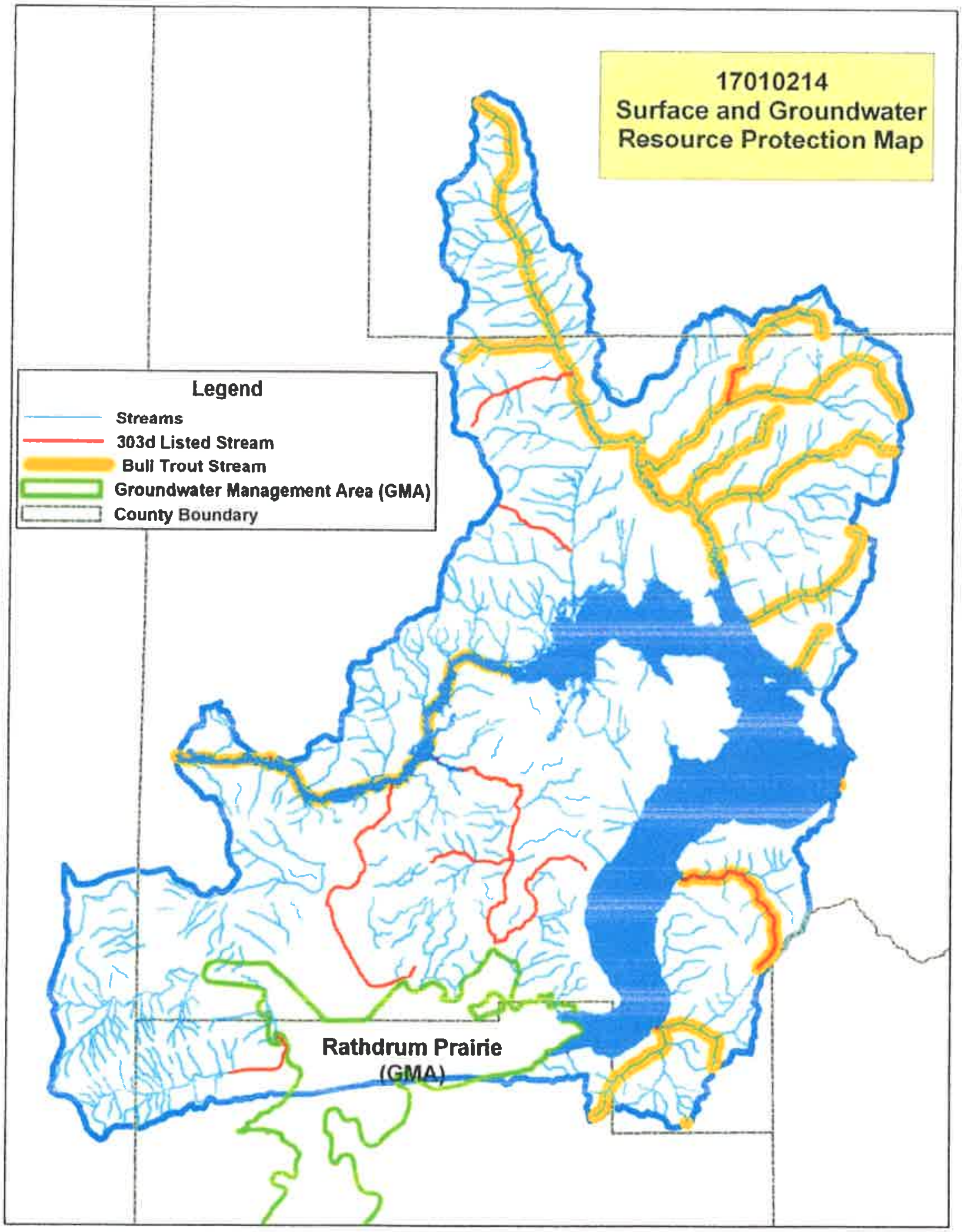
Conservation practices that can be used to address these water quality issues include erosion control, grazing management, irrigation water management, residue management, and riparian buffers.

Conservation practices that can be used to address these water quality issues include erosion control, grazing management, irrigation water management, residue management, and riparian buffers.

Watershed Projects, Plans, Studies, and Assessments*	
Federal:	*State:*
NRCS Watershed Plans/Studies/Assessments[14,15]	**IDEQ TMDLs**[16]
None	Pend Oreille River Subbasin TMDL (2001)
	Pend Oreille Lake (nearshore) TMDL (2002)
NWPPC Subbasin Plans and Assessments[18]	**IDEQ 319 Projects**[17]
Intermountain Province Subbasin Plan (2004)	Pack River Watershed Sediment Reduction (2003)
	IDFG Assessments
	Bull Trout Assessment (2004)
	SCC Plans/Projects[19]
	Pend Oreille River TMDL Implementation (in progress)
	Pend Oreille Lake (nearshore) TMDL Implementation Plan (complete)
	Hoodoo and Cocolalla Creeks (in progress)
	Pack River (in progress)
	Cocolalla Lake SAWQP (1996)
	Pack River Stream Channel Assessment (2003)
	ISDA Regional Water Quality Projects[20]
	None
	IDWR Comprehensive Basin Plans[21]
	None

* Listing includes past efforts in the watershed, and on-going studies and assessments.

Surface and Groundwater Resource Protection [22, 23, 24]



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Resource Concerns – Continued

Resource Concerns/ Issues by Land Use								
SWAPA*	**Specific Resource Concerns/Issues**	**Pasture**	**Hayland**	**Dry Crops**	**Surface Irrigated Crops**	**Sprinkler Irrigated Crops**	**Rangeland**	**Grazed or Ungrazed Forest**
Soil Erosion	Sheet and rill	x	x	x				
	Ephemeral or classic gully	x	x					
	Wind							
	Streambank	x	x	x				x
Water Quantity	Excess surface water runoff, flooding, ponding	x	x	x				
Water Quality, Surface	Suspended sediment	x	x	x				x
	Nutrients, organics and pesticides	x	x	x				x
Water Quality, Ground	Nutrients and organics	x	x	x				
	Pesticides	x	x	x				
Soil Condition	Organic matter depletion	x	x	x				x
	Compaction	x		x				x
Plant Condition	Productivity, health and vigor	x	x					x
	Plants not adapted or suited	x	x					x
	Noxious and invasive plants	x	x	x				x
	Wildfire hazard							x
Domestic Animals	Inadequate feed or water	x						x
Fish and Wildlife	Inadequate cover/shelter	x	x	x				x
Air Quality	Smoke and airborne soil particulate		x	x				x

*** SWAPA: - Soil, Water, Air, Plants and Animals**

Human considerations: Implementation of conservation practices and enhancement has the potential for change in management and cost of production. Installation of practices will have an upfront cost and require maintenance. In the short run increased management may be required as new techniques are learned. Land may be taken out of production for installation of practices or conversion to other uses, such as wildlife habitat. Long term benefits should result from increased soil health, benefits to water quality and wildlife habitat. Wildfire hazard concerns exist on all land uses.

poaching losses. Highway 95 and the Burlington Northern Santa Fe rail line, which travel north/south between the Cabinet and Selkirk Mountains, are responsible for a considerable amount of wildlife loss annually and are believed to have a significant impact on habitat connectivity.

Changes in fish communities have likely resulted in fewer migratory fish available to species such as bears and otters, particularly in tributary streams that no longer support large runs of bull trout, cutthroat trout, or mountain whitefish.

Development of wildlife habitats for residential and commercial purposes is ongoing and increasing as the area's population grows. Shoreline habitat has been modified by development, resulting in changes in vegetation communities, loss of wetlands, and human disturbance.

The Selkirk Mountains woodland caribou population ranges across the Lower Pend Oreille, Priest River, Upper Pend Oreille, and Kootenai subbasins. Adjacent habitat in British Columbia is integral to the existence of this population (W. Wakkinen, IDFG, personal communication). During the 1980's, poaching and collisions with vehicles were believed to limit the Selkirk caribou population (USFWS 1994). Programs instituted in the Selkirks to reduce the effect of these factors were largely successful but populations did not improve substantially, even with translocations of 103 caribou into the range from 1987 through 1998 (Wakkinen and Johnson 2000). Predation is believed to be limiting for woodland caribou in general (Bergerud 1978, Caughley and Sinclair 1994) and the Selkirk population in particular (Bergerud 1978). It has been hypothesized that large, long-term changes in habitat and other factors may have led to increases in predator numbers, thereby increasing predation on caribou (Wakkinen and Hayden, IDFG, personal communication).

The range of grizzlies outside of Canada and Alaska is now confined to six recovery zones located within the states of Montana, Wyoming, Idaho, and Washington. One recovery zone, the Selkirk Zone, includes portions of the Lower Pend Oreille, Priest River, Upper Pend Oreille, and Kootenai subbasins. This zone is adjacent to important grizzly bear range within British Columbia, Canada. The current population of grizzly bears within the Selkirk Zone is increasing slowly, but is far from meeting ESA de-listing criteria (Wakkinen and Johnson 2000). Human caused mortality, especially of females, by illegal shooting or killing bears in self-defense is apparently the limiting factor in the recovery of the Selkirk grizzly bear population (Knick and Kasworm 1989, McLellan *et al.* 1999).

The amount and quality of lynx foraging habitat is primarily a result of post timber harvest regeneration, wildfires, and to a lesser extent controlled burns. Livestock grazing also has the potential to impact lynx by removing herbaceous forage that snowshoe hares use during the summer. Ruediger *et al.* (2000) suggest that cattle grazing is also a factor in the decline of aspen stand regeneration in Rocky Mountain subalpine areas, and probably degrades snowshoe hare habitat in riparian willow areas as well. In contrast, wind throw, insects, and disease aid in creating lynx denning habitat. Lynx are relatively tolerant of human activity; however, urban development and roads with high traffic volumes may affect lynx movements (Stinson 2000). Lynx are limited by the availability of a winter prey base, primarily snowshoe hare, as well as environmental/anthropogenic factors including forest management practices, habitat fragmentation, wildfires, fire suppression, insect epidemics, and lynx harvest management (Stinson 2000).

Development is likely the greatest threat to waterfowl, upland game, and furbearers in the subbasin. The abundance and quality of suitable nesting, brood rearing, and foraging habitat is assumed to be limiting for waterfowl and upland game. Aquatic furbearers are likely limited by

Draft

Pend Oreille Subbasin Summary

October 2, 2000

Prepared for the
Northwest Power Planning Council

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DRAFT: This document has not yet been reviewed or approved by the Northwest Power Planning Council.

Minimum pool is normally reached between November 15 and December 1, with a target date of November 15 to facilitate kokanee salmon spawning.

The Clark Fork River is the largest tributary to Lake Pend Oreille. It drains the Clark Fork River watershed, an area of approximately 59,324 km^2 (Lee and Lunetta 1990). The river contributes approximately 92% of the annual inflow to the lake (Frenzel 1991) and most of the annual suspended sediment load. Tributaries to the Clark Fork below Cabinet Gorge Dam include Lightning Creek, Twin Creek, Mosquito Creek, and Johnson Creek. Pack River is the second largest tributary to the lake and is fed by a number of significant tributary watersheds, including Grouse Creek.

Annual runoff in the Clark Fork River is produced by melting snow, with peak flows typically occurring in May or June, but occasionally in April or July. Tributaries to the lake and Pend Oreille River may experience one or more run-off events. Mid-winter rain-on-snow events can result in rapid snowmelt, and in some years the peak flow from tributary watersheds occurs during these events. Lightning Creek and other tributaries draining the Cabinet and Bitterroot Mountains are particularly susceptible to rain-on-snow events due to high precipitation, their location in relation to the lake, prevailing winds, and the tendency for warm winter storms to pick up moisture from the lake. The Pend Oreille River is the only surface outflow from Lake Pend Oreille. The river flows for about 44 km from the lake's northwest corner near Sandpoint into Washington. Lake Pend Oreille is hydrologically connected to the Spokane Valley-Rathdrum Prairie aquifer at the lake's southernmost end, contributing about 44 million cubic meters (m^3) of water annually to the aquifer via subsurface flow (Hammond 1974, Drost and Seitz 1978).

Water Quality

Lake Pend Oreille is an oligotrophic (nutrient poor) lake. The lake's trophic status was determined in 1989 (Ryding and Rast 1989) using euphotic zone depth, annual mean total phosphorus concentrations, mean and maximum chlorophyll *a* concentrations, and mean and minimum secchi disc water transparency depths. Nutrient concentrations in shoreline areas and in the northern basin of the lake are considerably higher due to urbanization and suspended sediments in Clark Fork River inflow. Most of the annual phosphorus, and suspended sediment load enters the lake via the Clark Fork River (Hoelscher 1993). Studies of the pelagic zone (open water area) of Lake Pend Oreille indicated no major temporal changes in water quality variables such as secchi-disc readings, pH, alkalinity, dissolved oxygen, percent saturation, nutrients, chlorophyll-a, and trophic state (Woods 1991).

A number of stream segments within the Upper Pend Oreille subbasin are listed as water quality limited (IDEQ 1998). Granite Creek, Pend Oreille River, Pend Oreille Lake, North Fork of Grouse Creek, Caribou Creek, Fish Creek, Schweitzer Creek, Cocolalla Creek, and Hoodoo Creek are all listed for various "pollutants of concern" including sediment, flow, total dissolved gas (TDG), habitat alteration, and thermal modification. Sediment has also reduced the suitability for the production of native bull trout of a number of streams that are not listed, including Lightning Creek, its tributaries, and Twin Creek.

Vegetation

Historic vegetation patterns in the Upper Pend Oreille subbasin were largely influenced by wildfire. Early accounts and photographs of the subbasin indicate that old-growth stands of western red cedar, *Thuja plicates*, and other species were common in riparian zones and floodplains. Large cedar stumps can still be found in many riparian areas along subbasin streams. Uplands were more typically dominated by seral species in various stages of succession, with age and composition dependent largely on fire cycles, elevation, slope, and aspect.

Euro-American settlement of the Clark Fork River Valley and Lake Pend Oreille was accompanied by forest clearing, agricultural development, logging, introduction of non-native pests, mining, railroad construction, hydroelectric projects, and general urbanization. Forest products are an important commodity in the subbasin. Forest fires have had a profound impact on vegetation within the Upper Pend Oreille subbasin during the last century. One fire ecologist speculated that riparian areas along the Clark Fork River and Lake Pend Oreille might have escaped the 1910 forest fire that burned an estimated 1.2 million ha in western Montana and northern Idaho (Peek 1983 as cited in MDFWP 1984). Other streams in the watershed were burned extensively by timber companies to remove understory vegetation following riparian and up-slope logging operations (USFS 1993). Low elevation riparian zones near tributary mouths include areas with and without tree canopy cover. Along stream corridors where tree overstory does not exist or is thin, vegetation includes shrubs and small trees such as thin-leaf alder, *Alnus sinuate;* willows, *Salix spp.*; snowberry, *Symphoricarpos albus;* mountain maple, *Acer glabrum;* red-osier dogwood, *Cornus stolonifera;* blue elderberry, *Sambucus cerulea;* and black hawthorn, *Crataegus douglasii.* Where tree canopy is present, tree species include black cottonwood, *Populus trichocarpa;* water birch, *Betula occidentalis;* quaking aspen, *Populus tremuloides;* and a mix of conifer species including western red cedar, western hemlock, *Tsuga heterophylla*; Douglas fir, *Psuedotsuga menziesi;* grand fir, *Abies grandis;* and western white pine, *Pinus monticola.*

Conifer forests in the subbasin consist of mixed stands, typified by stands of western red cedar/western hemlock; stands of co-dominant Douglas fir and ponderosa pine, *Pinus ponderosa;* stands of Douglas fir; western larch, *Larix occidentalis;* lodgepole pine, *Pinus contorta;* and western white pine. Dense stands of Douglas fir, larch, and lodgepole are characteristic of slopes with north and east aspects. Relatively open stands of Douglas fir and ponderosa pine are typical on the warmer, dryer south and west aspects.

Representative species of upland shrubs include western serviceberry, *Amelachier alnifolia;* mountain maple; snowberry; mountain balm, *Ceanothus velutinus;* mallow ninebark, *Physocarpus malvaceus;* huckleberry, *Vaccinium spp.;* and others.

Vegetation can strongly influence conditions in streams. Canopy cover adjacent to streams provides shade and helps to maintain cooler water temperatures during summer months. Conifers may also provide insulation during winter months, reducing freezing and formation of anchor ice. Large trees which fall into streams and floodplains help to shape channels, create pools, provide cover and shade, introduce and store nutrients, dissipate stream energy, and contribute to overall channel stability (Murphy and Meehan 1991). Riparian vegetation also plays an important role in providing stream bank stability through binding of soils by roots. The amount, type, and stage of vegetation in a watershed can also influence stream flows. Vegetation removal by fire or timber harvest can result in increased peak flows during storm events and increased summer flows (Harr 1981 and King 1989). Increased peak flows during winter months, when bull trout eggs are incubating, may reduce hatching success.

Vegetation patterns have a profound influence on distribution and abundance of wildlife species in upland habitats. Stand replacing wildfires periodically replaced older, mature stands of timber, shifting wildlife species use from old-growth/mature forest dependent wildlife species, such as pileated woodpeckers and caribou, to species favoring early seral conditions, such as elk.

Fish and Wildlife Resources

Fish and Wildlife Status

The Upper Pend Oreille subbasin supports a significant complement of fish and wildlife species. Many are important to the region for economic, aesthetic, cultural, recreational, and ecological values.

Fisheries

Over 30 species of fish, including 12 native species, are found in the Upper Pend Oreille subbasin (Table 1).

Table 1. Fish species present in the Upper Pend Oreille subbasin.

Species	Origin	Location	Status
Bull trout (*Salvelinus confluentus*)	N	L,R,T	A/S-D
Westslope cutthroat trout (*Oncorhynchus clarki lewisi*)	N	L,R,T	C/S-D
Mountain whitefish (*Prosopium williamsoni*)	N	L,R,T	C/S-D
Pygmy whitefish (*Prosopium coulteri*)	N	L	U/U
Rainbow trout (*Oncorhynchus mykiss*)	E	L,R,T	A/S
Kokanee salmon (*Oncorhynchus nerka*)	E	L,R,T	C/D
Lake trout (*Salvelinus namaycush*)	E	L	C/I
Brook trout (*Salvelinus fontinalis*)	E	T	C/I
Brown trout (*Salmo trutta*)	E	L,R,T	C/S
Lake whitefish (*Coregonus clupeaformus*)	E	L	A/S
Longnose dace (*Rhinichthys cataractae*)	N	L,R,T	C/U
Redside shiner (*Richardsonius balteatus*)	N	L,R,T	C/U
Peamouth (*Mylocheilus caurinus*)	N	L,R	C/U
Tench (*Tinca tinca*)	E	L,R	C/I
Largescale sucker (*Catostomus catastomus*)	N	L,R,T	C/U
Longnose sucker (*Catostomus macrocheilus*)	N	L,R,T	C/U
Slimy sculpin (*Cottus cognatus*)	N	L,R,T	C/U
Torrent sculpin (*Cottus rhotheus*)	N	L,R,T	C/U
Burbot (*Lota lota*)	E	L,R	O/D
Northern pike (*Esox lucius*)	E	L	C/I
Tiger muskie (*Esox lucius x E. masquinogy*)	E	L	O/D
Yellow perch (*Perca flavescens*)	E	L,R	A/S
Walleye (*Stizostedion vitreum*)	E	L,R	O/D
Crappie (*Pomoxis spp.*)	E	L,R	C/S
Channel catfish (*Ictalurus punctatus*)	E	L,R	O/D
Brown bullhead (*Ameiurus nebulosis*)	E	L,R	C/S
Largemouth bass (*Micropterus salmoides*)	E	L,R	C/S-D
Smallmouth bass (*Micropterus dolomieui*)	E	L,R	C/S-D

Species	Origin	Location	Status
Pumpkinseed (*Lepomis gibbosus*)	E	L	C/S
Bluegill (*Lepomis macrochirus*)	E	L	O/I

E=Exotic, N=Native, L=Lake, R=River, T=Tributary, A=Abundant, C=Common, O=Occasional, U=Unknown, S=Stable, I=Increasing, D=Declining

Lake Pend Oreille supports a significant sport fishery. In 1991, anglers expended an estimated 465,000 hours fishing the lake with approximately 65% of the effort targeting trout and 35% of the effort targeting kokanee (Paragamian 1994). The world record bull trout, 14.5 kilograms (kg), and the world record rainbow trout, 16.8 kg, were taken from Lake Pend Oreille in 1949 and 1947, respectively. Currently, target species for management efforts in the lake are kokanee salmon, rainbow trout, bull trout, cutthroat trout, and lake trout. The kokanee fishery was closed to harvest, and harvest limits on lake trout and rainbow trout were relaxed in 2000 due to the steady declines in the kokanee population, which could be exacerbated by predation.

Prior to construction of Albeni Falls and Cabinet Gorge dams, the lower Clark Fork River supported important fisheries for migrating kokanee salmon, mountain whitefish, and bull trout. Westslope cutthroat trout were also present in the river and provided a fishery for fluvial and adfluvial fish. Currently, rainbow trout, brown trout, westslope cutthroat trout, and mountain whitefish are the principle sport fish in the lower Clark Fork River. Bull trout are also present and occasionally caught by anglers. Management direction is to improve habitat and recruitment to the river, with the fishery dependent on wild fish. Ecologically, restoring connectivity to the lower Clark Fork system is important as the Idaho portion currently serves as a sink for fish migrating downstream from Montana. Likewise, restoring access to the hundreds of miles of spawning and rearing habitat available in the Montana portion of the lower Clark Fork watershed provides an opportunity to bolster native populations of bull trout, westslope cutthroat trout, and mountain whitefish.

The Pend Oreille River, prior to the construction of Albeni Falls Dam, provided free flowing riverine habitat that supported a coldwater fishery for cutthroat trout, rainbow trout, mountain whitefish, and occasionally bull trout. Today, only a limited fishery for warmwater fish species and virtually no coldwater fish exist due to operational impacts of Albeni Falls Dam (Bennett and DuPont 1993). Management direction is to work with the USACOE on lake level management to improve conditions for warmwater species.

Bull Trout

Lake Pend Oreille and its tributaries have historically provided a highly regarded sport fishery for bull trout, including trophy specimens. Estimated harvest peaked in the 1950's, as the last of the fish produced from adfluvial runs to Montana tributaries became available to anglers. Legal harvest of bull trout was discontinued beginning in 1996 due to the pending Endangered Species Act (ESA) listing and declining spawning runs in several tributaries. Kokanee were recently documented to be the principle food item of bull trout over 406 millimeters (mm), comprising 66% of the diet (Vidergar 2000). The Pend Oreille bull trout population is comprised of a number of genetically distinct local populations, many of which have declined due to habitat loss. Despite local population declines in some tributary spawning stocks with an estimated total adult population between 8,000 and 16,000 fish (Vidergar 2000), the Pend Oreille bull trout population is generally considered to be one of the strongest remaining populations in the U.S. Local citizens and agency representatives developed the *Idaho Bull Trout Conservation Plan* (Lake Pend Oreille Bull Trout Watershed Advisory Group 1999). The plan calls for restoring bull trout such that healthy local populations are well distributed around the Lake Pend Oreille subbasin and that a harvestable surplus of fish will be available. Bull trout restoration is also a primary emphasis of the Lower Clark Fork Settlement Agreement (Settlement Agreement) forged by Avista and local, state, and federal entities as part of the relicensing of Cabinet Gorge and Noxon Rapids dams. The Settlement Agreement includes provisions for restoring fish passage past Cabinet Gorge and Noxon Rapids dams.

Westslope Cutthroat Trout

Westslope cutthroat trout comprised an important part of the sport fishery up until the 1960's, but have since declined. Hatchery production was used through the 1990's to supplement wild stocks and provide a limited harvest fishery. Hybridization with rainbow trout, competition, and loss of habitat have contributed to declines of westslope cutthroat trout, but they are still widely distributed in tributary streams and are an important component of the lower Clark Fork River fishery. Harvest limits on westslope cutthroat trout were reduced in in 2000 in an effort to reduce harvest. Cutthroat trout restoration projects, including fish passage are a key component of the Native Salmonid Restoration Plan (NSRP) in the Settlement Agreement.

Kokanee

Since being introduced through emigration from Flathead Lake in the 1930's, kokanee have established themselves as a keystone species in Lake Pend Oreille. Kokanee provide forage for predatory bull, rainbow, lake trout, bald eagles, and a host of other wildlife species. The Lake Pend Oreille kokanee fishery was one of the most significant kokanee fisheries in the western U.S. and Canada. During the 1950's and 1960's, kokanee harvest averaged 1 million fish annually with a high of 1.3 million fish in 1953. This made Lake Pend Oreille the largest fishery in Idaho. Kokanee abundance began declining in 1966 concurrent with deeper drawdowns of the lake (Figure 5) (Maiolie and Elam 1993). Fishery was closed in 2000.

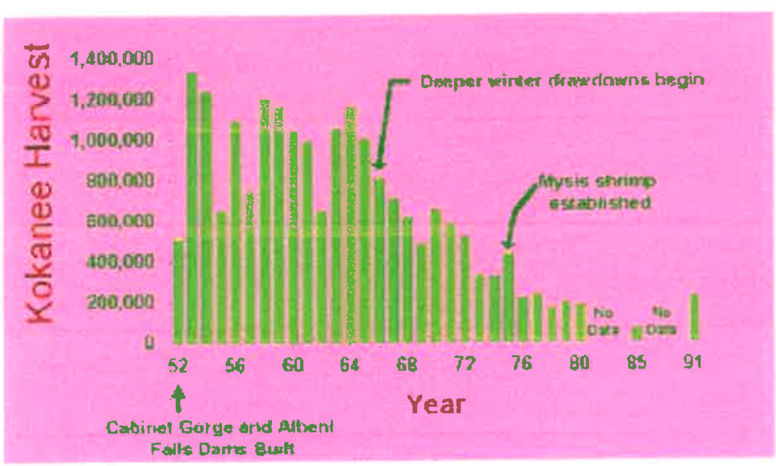

Figure 5. Harvest of kokanee from Lake Pend Oreille, Idaho

Kokanee salmon populations have declined precipitously since the 1960's (Figure 6). This decline has been largely attributed to the current operation of Albeni Falls Dam (Maiolie and Elam 1993; Paragamian and Ellis 1994). Historical population trends and harvest data indicate winter pool elevation effect kokanee abundance and harvest. Consistent annual drawdowns of the lake, below the elevation needed for flood control, exposed most of the shoreline gravel and limited kokanee spawning. Gravel surveys conducted in 1994 determined a 1.6-meter higher winter pool level would increase the amount of suitable kokanee spawning gravel by 560% (Fredericks *et al.* 1995).

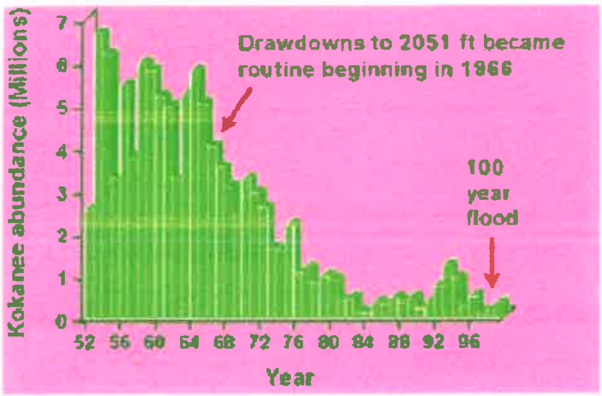

Figure 6. Estimates of kokanee abundance in Lake Pend Oreille, Idaho

The NPPC directed the USACOE to change the winter elevation of Lake Pend Oreille beginning in 1996. The lake was to be kept above an elevation of 626m msl for three winters. The IDFG investigated the effect of changed lake levels on kokanee production, the movements of shoreline gravel and sediment, and changes in the abundance of warmwater fish species in the Pend Oreille River. The higher winter lake level made an additional 167,225 m^2 of gravel available for kokanee (Fredericks *et al.* 1995). The survival rate for kokanee eggs to fry increased from 1.4% in 1995 to 9.6% in 1998 and 6.0% in 1999. This 500% increase in survival will be evaluated further. Additional studies were conducted on predation levels, the lake's energy budget, zooplankton, food availability for kokanee, opossum shrimp, and Eurasian watermilfoil, *Myriophyllum spicatum* (EWM).

Beginning in 2000, an emergency closure was imposed on kokanee harvest to maximize the number of spawners available to rebuild the population. The IDFG's management goals are to recover kokanee populations to a level where they can provide forage for trophy species and produce an annual harvest of 750,000 kokanee.

The kokanee population in the lake is monitored annually by mid-water trawling and hydroacoustics. The IDFG estimated kokanee abundance at 8.8 million fish in 1999, with a biomass of 240.4 metric tons, an annual production rate of 220.8 metric tons, and an annual yield to all sources of mortality of 235.8 metric tons (Maiolie 2000, in press). For comparison, total abundance was 13.7 million kokanee in 1996, with a biomass of 391.4 metric tons, an annual production rate of 299.3 metric tons, and an annual yield of 205 metric tons (IDFG files). These recent declines in kokanee abundance are considered very serious since even the higher abundance in 1996 was only at a one quarter of the population's recovery goal.

Rainbow Trout

Rainbow trout were first introduced into the Pend Oreille system in 1919, and the Gerrard strain rainbow trout, which are predaceous and grow to large sizes, were first introduced to the lake in 1941. Vidergar (2000) found that 77% of the diet of rainbow trout larger than 275 mm is kokanee. Trophy specimens exceeding 10 kg are caught every year and attract anglers from all over the country. Long-term management goals for the lake include continuing to provide a trophy rainbow trout fishery, utilizing kokanee salmon as a forage base. Bag limits, size restrictions, and season restrictions for rainbow trout were recently expanded to encourage angler harvest and reduce predation on the depressed kokanee population. These measures are intended to be short-term until the kokanee population shows signs of recovery as demonstrated by an increasing population trend. Resident rainbow trout contribute to the lower Clark Fork fishery, and rainbow trout are widely distributed in tributaries to Lake Pend Oreille and the lower Clark Fork River. Rainbow trout pose a threat of hybridization with westslope cutthroat trout, with hybrids being common in some portions of the subbasin.

Lake Trout

In 1925, the U.S. Fish Commission first introduced lake trout into Lake Pend Oreille. Lake trout dispersing from Flathead Lake, and possibly Upper Priest Lake and Priest Lake, likely contribute to the Lake Pend Oreille lake trout population. Lake trout are well established in Lake Pend Oreille and contribute to the sport fishery. They are considered to be a potentially significant threat to native fish and kokanee; therefore, the management emphasis is to reduce lake trout numbers through a year-round, no bag limit regulation. A mark-and-recapture population estimate of lake trout in 1999 was 1,792 fish with a 95% confidence interval of 1,054 to 5,982 (Vidergar 2000). Lake trout are thought to comprise 4% of the predator biomass and consume 2% of the kokanee production (Vidergar 2000).

Wildlife

The Upper Pend Oreille subbasin supports a diversity of wildlife species that provide important recreational opportunities for viewing, hunting, and trapping. Several species are federally listed under the ESA (Table 2).

Table 2. Wildlife species of the Upper Pend Oreille subbasin currently listed under the ESA

Species	Status
Grizzly bear (*Ursus arctos*)	Threatened
Woodland caribou (*Rangifer tarandus*)	Endangered
Gray wolf (*Canis lupus*)	Endangered
Lynx (*Lynx canadensis*)	Threatened
Bald eagle (*Halieeatus leucocephalus*)	Threatened

White-tailed deer, *Odocoileus virginianus,* are the most sought-after big game species, followed by elk, *Cervus elaphus*, black bear, *Ursus americanus,* and mountain lion, *Felis concolor*. Significant hunting activity is expended in pursuit of waterfowl, ruffed grouse, *Bonasa umbellus*, and wild turkeys.

Other big game species include mule deer, *O. hemionus;* moose, *Alces alces;* and mountain goat, *Oreamnos americanus*. Furbearers present include beaver, *Castor Canadensis;*

mink, *Mustela vison;* fisher, *Martes pennanti,* marten, *M. Americana;* river otter, *Lutra canadensis;* muskrat, *Ondatra zibethica;* and wolverine, *Gulo gulo.* Numerous small mammals are present.

Lake Pend Oreille, the lower Clark Fork River, and the Pend Oreille River have historically been important waterfowl migration and wintering areas. These areas provide important waterfowl nesting habitat as well. The Upper Pend Oreille subbasin supports 20% of all the wintering redhead ducks, *Aythya Americana,* in the Pacific flyway. Over 20 species of waterfowl using waters in the Upper Pend Oreille subbasin have been documented (Table 3).

Table 3. Waterfowl inhabiting the Upper Pend Oreille subbasin

Species
Mallard (*Anas platyrhynchos*)
Gadwall (*Anas strepera*)
Green-winged teal (*Anas crecca*)
Cinnamon teal (*Anas cyanoptera*)
Blue-winged teal (*Anas discors*)
American wigeon (*Anas americana*)
Pintail (*Anas acuta*)
Shoveler (*Anas clypeata*)
Ruddy duck (*Oxyura jamaicensis*)
Wood duck (*Aix sponsa*)
Redhead ducks (*Aythya americana*)
Canvasback (*Aythya valisineria*)
Ring-necked duck (*Aythya collaris*)
Lesser scaup (*Aythya affinis*)
Harlequin duck (*Histrionicus histrionicus*)
Bufflehead (*Bucephala albeola*)
Barrow's goldeneye (*Bucephala islandica*)
Common goldeneye (*Bucephala clangula*)
Common merganser (*Mergus merganser*)
Hooded merganser (*Lophodytes cucullatus*)
Canada goose (*Branta canadensis*)
Tundra swan (*Cygnus columbianus*)

Raptors using the area for nesting and/or as a migratory stop when food is plentiful include osprey, *Pandion haliaetus;* bald eagle; peregrine falcon, *Falco peregrinus;* and a variety of hawks and owls. Lake Pend Oreille supports one of the largest concentrations of nesting ospreys in the western U.S. and may support several hundred bald eagles during the winter migration period when spawned-out kokanee and wintering waterfowl are available as a food source (Martin *et al.* 1988). At least 10 pairs of bald eagles are known to nest along Lake Pend Oreille, the lower Clark Fork River, and the Pend Oreille River (C. Brengle, USACOE, personal communication).

Many species of songbirds, including year-round residents and neotropical migrants, are known to use the Upper Pend Oreille subbasin. At least two great blue heron, *Ardea herodias,* rookeries are present along the Pend Oreille River and the Clark Fork River delta. Martin *et al.* (1988) completed an assessment of wildlife impacts associated with the construction and inundation of Albeni Falls Dam. Table 4 (Martin, *et al.* 1988) summarizes wildlife habitat losses for the target wildlife species. An interagency team of biologists used the Habitat Evaluation Procedure (HEP) to determine the quality and quantity of wildlife habitat impacted by the dam.

Table 4. Summary of Habitat Units (HUs) impacted by Albeni Falls Dam

Target species	Pre-construction HUs	Post-construction HUs	Net impact HUs
Mallard	10,995	4,970	-5,985
Canada goose	8,197	3,498	-4,699
Redhead	7,387	4,008	-3,379
Bald eagle (breeding)	7,730	3,222	-4,508
Bald eagle (wintering)	8,103	3,738	-4,365
Peregrine falcon	-	-	6,617 acres
Black-capped chickadee	3,157	871	-2,286
Yellow warbler	350	421	+71
White-tailed deer	2,686	1006	-1,680
Muskrat	3,722	2,016	-1,756

Habitat Areas and Quality

Fisheries

The Panhandle Bull Trout Technical Advisory Team (1998) assessed the condition of habitat and watershed condition for known and suspected bull trout waters within the Upper Pend Oreille subbasin (Appendix 1). Complete descriptions of these waters are provided in the *Lake Pend Oreille Bull Trout Key Watershed Problem Assessment* (Panhandle Bull Trout Technical Advisory Team 1998).

Fish habitat in tributary streams within the Upper Pend Oreille subbasin has been impaired through delivery of excess bedload sediment, fine sediment delivery, loss of large woody debris and riparian forest habitat, channelization, and isolation of streams from their floodplains (Panhandle Bull Trout Technical Advisory Team 1998). Man-made fish migration barriers and water diversions are scattered around the subbasin, resulting in loss of access to spawning and rearing habitat and loss of flow and migrating fish to diversions (Appendix 1).

During the summer and fall months, the lower 5.4 km of the Clark Fork River are flooded by backwater from Albeni Falls Dam, creating an unproductive environment for native and introduced salmonids. Riverine habitat is further compromised by Cabinet Gorge Dam and its operations, resulting in blocked fish passage, rapidly fluctuating river flows, and, during high water years, high levels of dissolved gas. The Settlement Agreement resulted in an increase in minimum flows released from Cabinet Gorge Dam from 85 cubic meters per second (cms) to 142 cms. The increased minimum flow results in an increase of over 4 ha of permanently wetted riffle habitat.

Cabinet Gorge Dam presents a complete migration block to fish migrating upstream from the Clark Fork River. Steps are underway to restore fish passage as part of the Settlement Agreement. There are high levels of TDG in the lower Clark Fork River, Lake Pend Oreille, and the Pend Oreille River as a result of river flows spilling over Cabinet Gorge Dam during periods of high runoff. High TDG levels resulting from spill at Cabinet Gorge Dam may affect fish populations. Avista is working to reduce TDG as part of the Settlement Agreement. The effects of modified flow regimes in the lower Clark Fork River resulting from Hungry Horse Dam operations are unknown.

The Pend Oreille River provides good summer habitat for warmwater species including largemouth bass and yellow perch, but winter drawdown resulting from Albeni Falls Dam operations significantly compromises the ability of the river to support a healthy warmwater fishery. Riverine habitat in the Pend Oreille River below Albeni Falls is partially inundated by Box Canyon Dam and is an unproductive environment for both warmwater and coldwater sport fish. Consequently, only a marginal sport fishery exists in the Pend Oreille River in Idaho. It is not known what impact Albeni Falls Dam has on TDG. Albeni Falls Dam is a complete upstream migration block to fish.

In general, Lake Pend Oreille continues to provide good rearing habitat for coldwater fish species, but Albeni Falls Dam operations have resulted in impaired shoreline spawning habitat for kokanee salmon. Over 16 ha of high quality kokanee spawning habitat is estimated to be lost due to a 3.5-meter drawdown of Lake Pend Oreille during the winter months. Lowering of the lake to 625m msl each year has not allowed for shoreline gravel to be cleaned and resorted at a depth where it is available for kokanee spawning. Consequently, most kokanee spawning takes place at the south end of the lake where conditions are favorable. Studies are currently underway that address how dam operations may be changed to improve shoreline spawning. The effects of elevated TDG on lake fishes during periods of high runoff are currently not known but are under study by Avista.

Lake Pend Oreille's nutrient budget may also be affected by Albeni Falls Dam operations. Prior to impoundment, Lake Pend Oreille flooded well-vegetated shoreline areas during the spring, which likely resulted in an influx of nutrients to the lake at the onset of the summer growing season. Albeni Falls Dam operations inundated shoreline vegetation, resulting in an initial significant release of nutrients. Over time, that vegetation has been lost and higher elevation vegetation is only rarely flooded. Thus, it is possible that an important seasonal source of nutrients has been lost. Early summer nutrient releases would benefit plankton blooms and growth of kokanee salmon and other juvenile fish. Drawdown of the reservoir also results in an unproductive shoreline environment for production of aquatic invertebrates, potentially reducing a food source for shoreline feeding species such as cutthroat trout.

Wildlife

Upper Pend Oreille subbasin wildlife habitats range from sub-alpine areas of the Selkirk, Cabinet, and Coeur d'Alene Mountains to deepwater areas within Lake Pend Oreille. Habitats can be grossly divided into upland coniferous forest, and wetland/riparian/lake. The following discussion includes general descriptions of each of these divisions within the Upper Pend Oreille subbasin.

Upland Coniferous Forest

The moist, mild climate of the Pend Oreille subbasin contributes to the occurrence of richly diverse and productive forests dominated mainly by coniferous species. The diversity of the subbasin forest landscapes resulted from a complex interaction of elevation, aspect, climate, topography, geology, fire ecology, human influence, and soils. Perhaps the factors with the greatest effect are fire suppression, logging history, and white pine blister rust. These factors resulted in disturbance and subsequent successional processes that are very different today than those that naturally occurred prior to Euro-American settlement. Early seral species such as ponderosa pine, western larch, and western white pine have declined in occurrence, while Douglas fir, grand fir, and western hemlock now dominate much of the forest landscape. The area occupied by old-growth forest has also been significantly reduced. Further, there are fewer large trees, snags, and downed woody debris within forest stands irrespective of successional stage. Generally, the Pend Oreille subbasin forests have lost diversity at a landscape scale.

Perhaps the most threatened forest type is low elevation ponderosa pine habitat where fire suppression and past logging resulted in replacement of widely spaced large trees, snags, and logs with dense, young Douglas fir and grand fir forests. These encroaching stands, compete with relic old trees for space and nutrients, eliminate ponderosa pine regeneration, and increase the potential for stand-replacing fire. It is estimated that greater than 75% of historic Interior Columbia Basin old-growth ponderosa pine ecosystems have been lost (USFS and BLM 1997). Noss *et al.* (1995) listed old-growth ponderosa pine forests as endangered (85 to 95% decline) in the northern Rocky Mountains, Intermountain West, and eastside Cascade Mountains. Henjum *et al.* (1994) recommended prohibiting logging of dominant or codominant ponderosa pine from forests in eastern Washington and Oregon, and Ritter (2000) identified dry ponderosa pine/Douglas fir/grand fir forests as a priority habitat for bird conservation in Idaho, with a goal of preventing additional loss of old-growth ponderosa pine forests. Low elevation old-growth ponderosa pine forests are especially important to flammulated owls, wintering ungulates, and animals such as black bears, grizzly bears, wolves, wolverine, fisher, lynx, cougar, and bald eagles that seek carrion associated with ungulate winter ranges.

An added impact to low elevation forests is recently accelerated subdivision and residential development. Impacts associated with residential development include removal of natural vegetation, which provides cover, forage, roosts, nest sites and dens, and increased human-related disturbances such as free-ranging dogs, snowmobiling, and cross-country skiing. In addition to direct mortality, harassment of wildlife by dogs during the winter stress period may predispose animals to other forms of mortality such as starvation. Habitat losses associated with rural residential development tend to be permanent. Consequently, impacts compound as development proceeds.

Some important conservation measures for upland forests in the Upper Pend Oreille subbasin include protection and restoration of low elevation ponderosa pine forests, and securing key low-elevation wildlife habitat from residential development.

Wetland/Riparian/Lake

Wetlands, riparian areas, and lakes within the Upper Pend Oreille subbasin were strongly influenced by past glaciation. Wetland areas in the subbasin can be separated into two divisions: wetlands associated with rivers, streams, and floodplains; and isolated glacial depressions and kettle lakes. Floodplain wetlands have greater hydrologic and nutrient dynamics and are more biologically productive, while glacial depressions have relatively stable water levels, and limited surface water and nutrient inputs. Due to anoxic conditions associated with continual saturation in wetlands associated with glacial depressions, organic material is incompletely decomposed. This results in organic material accumulation and peatland development. Peatlands, while naturally less biologically productive than floodplain wetlands, often support rare plants.

Most wetlands in the Upper Pend Oreille subbasin have undergone significant alteration or loss. Major influences include early beaver trapping, drainage for agricultural conversion, and hydrologic alteration associated with Albeni Falls Dam. Fur trapping resulted in near complete removal of beaver during the 19th century in North America (Ringelman 1991). While largely undocumented, the effects of beaver removal on wetland extent must have been considerable in the Upper Pend Oreille subbasin. Beaver continue to re-occupy and restore wetlands across the subbasin today.

Most wetlands in the subbasin were at least partially drained for agricultural production by the 1930's. Agricultural production often included shrub removal and grazing, which continue to inhibit beaver re-occupancy and restoration. Floodplain wetlands were often the most completely drained and converted to agriculture due to the presence of productive soils and ease of drainage. Glacial depressions and kettle lakes were often only partially drained due to deep peat soils, deep kettle lakes, and lack of topographic outlet. Hoodoo Creek is a notable example due to the extensive floodplain wetlands, and the existence of a legal drainage district.

The greatest single impact to wetlands in the subbasin was construction and operation of Albeni Falls Dam. Pre-dam hydrology included steeply rising lake levels with spring run-off, peak lake levels in June, and receding lake levels through summer. This resulted in heavily vegetated, highly productive, seasonally flooded wetlands along the low gradient northern shorelines of Lake Pend Oreille, especially at the mouths of tributary creeks and rivers.

Following construction of Albeni Falls Dam, the water level of Lake Pend Oreille was regulated so that water levels were held above historic lake levels through the growing season. The lake is then drawn down in September. This regulated hydrology removed most vegetation from wetland areas so that drawdown, beginning in September, exposes poorly vegetated mudflats where productive, seasonally flooded wetlands formerly occurred. Martin *et al.* (1988) determined that 2,677 ha of former wetlands were converted to open water due to development and operation Albeni Falls Dam.

Potential nesting sites and cover for a diversity of wildlife species were removed due to a loss of vegetation and conversion of wetlands to open water. Wetland plant species that produce seeds, rootstocks, and vegetative parts selected by wildlife as food were eliminated from most former wetlands (USFWS 1960). Further, benthic invertebrates critical to ducks, shorebirds, bats, swallows, swifts, and many other insectivorous birds are significantly reduced in the drawdown zone (Bennett and DuPont 1993). These impairments resulted in an indicated 50% reduction in duck production from brood counts conducted in 1949, 1958, and 1960 (USFWS 1960).

Some of the most productive wetlands associated with Lake Pend Oreille occur at the mouths of streams and rivers where loose alluvial soils accumulated in deltas. Vegetation loss associated with operation of Albeni Falls Dam exposes loose alluvial soils to wave action and undercutting at high water, followed by sloughing upon annual fall drawdown. Erosion of important wildlife habitat in these locations has been significant and is ongoing. Martin *et al.* (1988) estimated the annual erosion rate due to operation of Albeni Falls Dam at 12 ha per year. Sites where ongoing losses are of special concern include the Clark Fork River delta, Pack River delta, Strong's Island, and the mouths of Priest River, Hoodoo Creek, Hornby Creek, and Carr Creek. Due to the historic productivity of these areas to fish and wildlife, they often support important cultural resources. Sandberg noted apparent island erosion of 3.35 m at the base of the shoreline, and 2.4 m at the top of the shoreline slope during 1989 (P. Cole, IDFG, personal communication).

Habitat losses in the Clark Fork River delta merit special description because they represent the largest contiguous floodplain wetland complex in the Upper Pend Oreille subbasin, and impacts are further compounded by the influence of Cabinet Gorge and Noxon Rapids dams.

Following glacial recession, ancient Lake Missoula was permanently drained, and the Clark Fork River carved channels into the stiff lacustrine deposits forming the Clark Fork River delta at the mouth of the lower Clark Fork River at Lake Pend Oreille. These channels, with alluvial landforms and historic lakeside beaches created by sediment transported down the Clark Fork River, formed a rich and diverse complex of old wetland river channels, active river channels, islands, and floodplain wetlands. It can be noted from historic photographs that the area was heavily forested by a mixture of cottonwoods and conifers. Included in the approximately 1,214 ha of the Clark Fork River delta were stands of old-growth western red cedar

Early logging removed much of the old-growth western red cedar in the Clark Fork River delta. However, large-scale habitat degradation occurred due to operation of Cabinet Gorge, Noxon Rapids, and Albeni Falls dams. Upstream dams impeded sediment transport to the delta, prohibiting development of delta landforms, and the protective lakeside beach. Widely fluctuating flows associated with dam operations continue to erode delta shorelines that would naturally be protected by armored streambeds during low fall/winter flows. Compounding these impacts is an unnaturally elevated lake level during the growing season due to operation of Albeni Falls Dam. This elevated lake level removed protective vegetation due to deep inundation in areas that were formerly seasonally flooded. Elevated lake levels and lack of protective vegetation and lakeside beach exposed the delta to accelerated erosion associated with a long wind fetch across Lake Pend Oreille. Further, following growing season inundation, poorly vegetated banks slough during drawdown in late summer and early fall. The result has been the loss of roughly 50% of functional delta wildlife habitat and ongoing losses estimated at 3.2 to 4.8 ha per year (Parametrix 1998).

Important wetland/riparian/lake conservation measures would include wetland protection and restoration, and erosion control in sites affected by the operation of Albeni Falls Dam. Ideally, eroded habitats due to dam operations would also be restored.

Watershed Assessment

Several recent reports describe the Upper Pend Oreille subbasin and its fish and wildlife resources. These documents include the *Lake Pend Oreille Key Watershed Bull Trout Problem Assessment* (Panhandle TAT 1998), the *Lake Pend Oreille Key Watershed Bull Trout Conservation Plan* (Lake Pend Oreille Bull Trout WAG), the *Albeni Falls Wildlife Protection, Mitigation, and Enhancement Plan* (Martin *et al.* 1988), and the *Idaho Department of Fish and Game Five Year Fish Management Plan* (IDFG 1996). Many IDFG annual reports, funded by either Dingell-Johnson or the BPA, have focused on the Lake Pend Oreille kokanee fishery. Master's theses from the University of Idaho and Eastern Washington University have described conditions in the lake, the Pend Oreille River, and tributary streams. Descriptions of specific portions of the subbasin are also provided in USFS National Environmental Protection Act (NEPA) documents, Cumulative Watershed Effects (CWE) analyses performed by the Idaho Department of Lands (IDL) and a significant number of studies conducted by Avista. Recent studies by the USFS Rocky Mountain Research Station and the University of Montana describe the genetic structure of bull trout populations in Lake Pend Oreille and lower Clark Fork River tributary streams.

Major Limiting Factors

The two primary limiting factors for fish, wildlife, and associated habitats in the Upper Pend Oreille subbasin are habitat loss and non-native species competition. Habitat loss can be described in a variety of ways, but is generally referred to as the loss of connectivity, quality, quantity, and diversity. Many environmental and managed factors can contribute to these limiting factors. Several of these key factors are described further in more detail.

Fisheries

Key factors limiting fish populations in the Upper Pend Oreille subbasin are described in *Resident Fish Planning: Dworshak Reservoir, Lake Roosevelt, and Lake Pend Oreille* (Fickeisen and Geist 1993), the *Lake Pend Oreille Key Watershed Bull Trout Problem Assessment* (1998), IDFG reports, and Master's theses from the University of Idaho. Limiting factors can result from either human activities or natural events, acting separately or cumulatively.

In the Upper Pend Oreille subbasin, limiting factors for fish include lake and stream habitat conditions; outside influences on the species including competition, hybridization, prey availability, and predation (including human predation); and biological constraints inherent to the species (Panhandle Bull Trout Technical Advisory Team 1998). Limiting factors are not equally distributed across the basin and different species may have different limiting factors.

Limiting factors in the lake for kokanee have been well documented. Stock-recruitment curves for kokanee declined from the early 1950's (Bowler 1980) to the 1990's (Fredericks *et al.* 1995) and put the entire population at risk of collapse. Equilibrium points on the curves were approximately 5 million adult kokanee between 1952 and 1965, 3 million kokanee between 1965 and 1975, and 1 million kokanee between 1977 and 1994. Declines in the stock-recruitment curves are due to declines in habitat. The mechanism for the declines is rather straightforward. Wave action sorts the gravel on the shorelines creating silt-free areas for kokanee spawning. Drawdowns in the fall drop the water level below the wave-washed zone, which limits the availability of spawning habitat. Also, lowering the lake to 625m msl each year prevents the creation of spawning areas at 1 to 1.6 m below the surface where they would be useful for kokanee spawning. Fredericks *et al.* (1995) estimated only 35,370 m^2 of gravel below 625 m elevation, but 197,685 m^2 of spawning gravels below the 626.4 m elevation. Limitations in the spawning area are thought to limit the kokanee population to a low level. Experimentally keeping the lake higher in the winter (which puts more gravel in the water) has met with promising results. Survival of kokanee eggs increased four to seven fold during two of three test years (Maiolie *et al.* 2000, Maiolie *et al.* in press). Further work is needed to reduce the confounding effects of floods and declining kokanee abundance but results point to spawning habitat as a limiting factor. It has been hypothesized that opossum shrimp may limit kokanee abundance. Studies are continuing, but to date no limitations due to shrimp were found (Clarke 1999). Growth and survival of newly emerged kokanee fry does not show adverse effects due to shrimp. Historically, the kokanee population declined concurrently with changes in water level management and nearly a decade before shrimp became established in the lake, which points to spawning habitat as a limiting factor.

The Pend Oreille River fluctuates between a cold flowing river during the winter months and a warm slackwater reservoir during the summer months. Lack of suitable overwintering habitat limits the warmwater fishery, and warm water during the summer precludes a coldwater fishery. Higher winter pool levels could result in a seven-fold increase in largemouth bass overwintering area and a viable fishery (Bennet and DuPont 1990).

The lower 5 km of the Clark Fork River support a seasonal coldwater fishery during the winter months, but some of the most diverse and productive riverine habitat in the lower Clark Fork is compromised by the summer pool flooding otherwise productive riffle habitats. Peaking operations at Cabinet Gorge Dam lower the productivity of the Clark Fork River, but a good trout fishery is present year-round in free flowing reaches.

Instream habitat conditions that influence bull trout and westslope cutthroat trout distribution and abundance include flow, water temperature, cover, connectivity, and habitat complexity. Living space for these species has been reduced in some streams through loss of flow; excess bedload filling in pools; widening of stream channels resulting in water too shallow to support fish; loss of large woody debris recruitment needed to create pools and cover; fine sediment covering spawning gravels; or filling in the spaces between rocks where juvenile bull fish hide. Shifting bedload in unstable streams may reduce incubation success by physically damaging eggs of fall spawning fish such as bull trout. Shifting bedload in unstable streams is believed to be a significant limiting factor in streams on the northern and eastern tributaries to Lake Pend Oreille, and is primarily associated with significant levels of timber management and road construction (Panhandle Bull Trout Technical Advisory Team 1998). Fine sediment can reduce the flow of oxygenated water into redds, reducing hatching success, and is a problem in upper Pack River tributaries (Panhandle Bull Trout Technical Advisory Team 1998). Water temperature can be influenced by streamside vegetation management or land management practices that alter groundwater inflow. Loss of shade or groundwater inflow can result in temperature conditions that are unsuitable for bull trout and other salmonids. Limiting factors for each of the bull trout supporting tributaries are thoroughly discussed in the *Lake Pend Oreille Key Watershed Bull Trout Problem Assessment* (1998).

Dam construction on the Clark Fork River, beginning in 1913 with construction of Thompson Falls Dam, cut off hundreds of kilometers of spawning and rearing habitat for migratory species such as bull trout, westslope cutthroat trout, and mountain whitefish. After 1913, the accessible watershed available to Lake Pend Oreille fish upstream of Albeni Falls Dam consisted of the Pend Oreille River and its tributaries, Lake Pend Oreille and its tributaries, and the Clark Fork River and its tributaries upstream to Thompson Falls Dam. After construction of Cabinet Gorge Dam blocked the Clark Fork River in September 1951, the total watershed area available to bull trout, excluding the Priest River subbasin and the Lower Pend Oreille subbasin, was further reduced by about 43% (Panhandle Bull Trout Technical Advisory Team 1998). Overall, it is estimated that less than 10% of the historic range of bull trout in the Upper Pend Oreille subbasin is accessible to bull trout as a result of dam construction (Panhandle Bull Trout Technical Advisory Team 1998). Restoration of fish passage at Cabinet Gorge and Noxon Rapids dams is currently underway as an adaptive management program under the Settlement Agreement. If this program is successful, it will restore fish passage back to conditions found between 1913 and 1952.

Biological constraints inherent to fish include reproductive potential, existing genetic diversity within populations, and behavioral attributes. Reproductive potential can be influenced by factors that select for fish size, such as angling, because larger females produce more eggs than smaller females. Factors that increase mortality on juvenile and sub-adult fish can influence reproductive potential for species such as bull trout, which typically mature at older ages than some other fish species. Genetic diversity can be influenced by introductions of non-native fish into populations, shrinking population size, and fragmentation of populations through migration barriers. Behavioral changes can occur through selective breeding in a hatchery environment or introductions of new genetic material but would be a function of genetic changes. To increase the likelihood of a population persisting through time, fish populations with genetic material that is adapted to local conditions must be maintained. In addition, population sizes must be large enough that a full range of genetic diversity is retained, providing a greater probability of a population withstanding environmental changes or disturbances. Temporary behavioral changes may result from stress brought on through competition or other factors; the genetic integrity of a population can determine how well the population responds to stress.

Reproductive potential of a bull trout population can be significantly impacted by hybridization with brook trout. The sharp decline in the kokanee population will result in lost forage for top predators such as bull trout and rainbow trout, and it is anticipated that this will eventually limit predator populations if not reversed (Mailolie 1999). Competition for spawning areas with other species, such as between bull trout and brown trout, can directly reduce reproductive success if competition results in redd superimposition. Competition for food or habitat that is in limited supply or predation can limit populations by reducing survival to spawning age. Lake trout pose this threat to bull trout, cutthroat trout, and kokanee in Lake Pend Oreille, but lake trout on their own are not currently believed to be limiting fish populations due to their relatively low numbers. The combined presence of lake trout, rainbow trout, and bull trout may act to further limit the kokanee population.

Illegal harvest of some species, particularly bull trout, has been cited as a limiting factor in some spawning streams (Panhandle Bull Trout Technical Advisory Team 1998).

Wildlife

The presence, distribution, and abundance of a number of wildlife species in the Upper Pend Oreille subbasin have been affected by habitat losses due to hydropower development, agricultural development, urbanization, timber harvest, road construction, legal and illegal wildlife harvest, and natural and human-caused events. These factors continue to limit wildlife populations. Current operation of the hydropower system and, in particular, lake level management have affected the availability of aquatic macrophytes to some species of waterfowl, resulting in apparent changes in distribution and use patterns of waterfowl. Ongoing habitat loss due to dam operations, particularly the loss of unique habitat types such as those found in the Clark Fork River delta, result in an ever-shrinking habitat base for several species of waterfowl, furbearers, songbirds, shorebirds, big game, and raptors. Productive wetland habitats have been converted to mudflats due to inundation by Albeni Falls Dam. Operation of Albeni Falls dam has resulted in an estimated loss of 12 ha per year of delta, island, and shoreline habitats around Lake Pend Oreille, the lower Clark Fork River, and the Pend Oreille River (Martin *et al.* 1988). Peaking operations and trapping of river sediments by Cabinet Gorge Dam are also responsible for the loss of approximately one hectare per year of Clark Fork River delta habitat (Parametrix 1988).

Loss of old-growth habitat types due to logging, fire, development, and dam operations limit the ability of old-growth dependent species to thrive in the Upper Pend Oreille subbasin. Woodland caribou are considered to be one of the most endangered mammals in the United States; logging and fires resulting from human and natural causes have largely impacted their old-growth and mature forest habitat.

An extensive forest road network and the presence of major highways and rail lines have resulted in the loss of security habitat and fragmentation of habitat, particularly for wide ranging species such as grizzly bear, elk, and moose. Extensive road networks contribute to increased

Pend Oreille River Temperature Total Maximum Daily Load

Water Quality Improvement Report

DEPARTMENT OF ECOLOGY
State of Washington

November 2011 *Revised*
Publication No. 10-10-065

Pend Oreille River
Temperature
Total Maximum Daily Load

Water Quality Improvement Report

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What is a total maximum daily load (TMDL)?

The federal Clean Water Act (CWA) requires that a TMDL be developed for each of the water bodies on the 303(d) list. The TMDL study determines the extent of the water quality problem(s) and the underlying causes, and then specifies a limit on the amount of pollutants to improve water quality and return the surface water to criteria, achieving its beneficial uses. Then Ecology, with the assistance of local governments, agencies, and the community develops a plan that describes actions to control the pollution and a monitoring plan to assess the effectiveness of the water quality improvement activities. The water quality improvement report (WQIR) consists of the TMDL study and implementation strategy or plan.

Study area

The Pend Oreille River is part of the Pend Oreille/Clark Fork watershed, which drains parts of Montana, Idaho, and Washington as well as a portion of British Columbia, Canada before entering the Columbia River. The Kalispel Indian Tribe (Tribe) Reservation is located along a ten-mile stretch the Pend Oreille River in Washington. The bulk of the reservation is on the east side of the river north of Usk, but a small portion is located on west side of the river north of Cusick.

The focus of this study is the 72-mile section of the Pend Oreille River from its entrance into Washington, near the city of Newport, to its northern exit into British Columbia, Canada. The Pend Oreille River watershed in Washington State encompasses about 1,000 square miles and comprises water resource inventory area (WRIA) 62. For the analysis, the river was divided into 12 reaches.

Within the study area, river hydraulics are affected by three hydroelectric facilities including:

1) Albeni Falls Dam, located in Idaho upstream of the Washington-Idaho Stateline and operated by the U.S. Army Corps of Engineers (COE).
2) Box Canyon Dam, located near the town of Ione and owned by the Pend Oreille Public Utility District.
3) Boundary Dam, located 18 miles below Box Canyon Dam and operated by Seattle City Light.

Temperature criteria and its assessment

The Pend Oreille temperature criteria has two parts. Part 1 applies when temperatures are over 20°C. If the natural condition temperatures exceed 20°C, then the allowable increase is 0.3°C. Part 2 of the criteria applies when temperatures are under 20°C.

Both Washington State's and the Kalispel tribal water quality criteria reference both an existing and a natural temperature condition designed to protect salmonids. The natural condition is a river temperature regime present prior to hydroelectric management, point source discharge, and riparian vegetative alteration. Because of the current changes to the river as a consequence of the dams, the natural temperature condition is one that can only be estimated through the application of a water quality model. For this reason, this study used the CE-QUAL-W2 water quality model to describe both the existing and natural conditions for the Pend Oreille River. The model was used to examine, individually, the relative influence of riparian shade levels, point source discharges, and the hydroelectric facilities' operations on current river temperatures.

Overview of results

Results indicate that both the Pend Oreille Public Utility District's Box Canyon Dam and Seattle City Light's Boundary Dam increase the heat load to the Pend Oreille River to levels that result in the exceedance of the temperature criteria. Cumulatively, the effect of the hydroelectric facilities on Pend Oreille River water temperature is subtle: daily maximum temperatures in many reaches of the river are cooler than what is predicted to have occurred naturally and, where warming does occur (most prominently in the reaches directly upstream of the facilities) it tends to be low, about 1°C above what occurred naturally. There are several reasons for this:

Water source: Lake Pend Oreille provides the vast majority of flow through the study area, both historically and currently. At Newport, the most upstream reach in Washington and situated below Albeni Falls dam, river temperatures are cooler now than what is predicted to have occurred naturally. This is due to the dam maintaining the lake level in the mid and late summer higher than what it would have been under natural conditions. The higher lake level allows for deeper, cooler water from the lake to enter the Pend Oreille River. This cool water buffers sources of river warming from Newport to Blueslide so that river temperatures are cooler now than before the dams were built. Box Canyon and Boundary dams also depress the maximum temperatures observed in their associated tailrace reaches by withdrawing cooler subsurface water from their forebays and discharging it downstream after power generation.

Hydraulic changes: Because of the dams the river is now deeper and wider, with lower average velocities in comparison to what occurred naturally. These changes are most evident during the critical summer months when the warmest temperatures occur. This increased storage now buffers the river from large temperature fluctuations and is one of the reasons why cooler temperatures found at Newport (downstream of the Albeni Falls tailrace) can now be observed in temperature profiles 40 miles down-river at Blueslide. These hydraulic characteristics also buffer temperature changes associated with alterations in mainstem or tributary shading and the presence of NPDES discharges. In comparison, the Pend Oreille River's natural channel flow characteristics were narrower and shallower and subject to greater gains and losses in heat which, in turn, affected the range in temperature.

Temperature criteria exceedances

Despite the hydraulic changes and their overall effect on buffering temperature shifts, the temperature criteria for the Pend Oreille River was exceeded in particular reaches (Table ES-2). This occurred most prominently in the forebays of Box Canyon and Boundary dams, where Part 1 of the criteria, concerning maximum temperatures, was exceeded by an average (2004, 2005) of 0.94°C and 0.59°C, respectively.

For Part 2 of the criteria, Ecology analyzed temperatures under 20°C to 12°C. The 12°C lower limit was applied because bull trout use the river for migration in the early fall and are sensitive to temperatures above that level. (Pend Oreille River bull trout are listed for protection under the

Federal Endangered Species Act.) During the time-frame associated with these temperatures (September through October), the criteria was exceeded for all of the Boundary reaches. The level of exceedance increased longitudinally from 0.14°C at Metaline to 0.53°C at the Boundary tailrace (Table ES-2).

Allocations

State line: Ecology set an assumption to comply with 2004 existing temperatures at the Idaho-Washington Stateline. Setting this allocation protects the river from additional heating upstream and ensures viability of allocations downstream.

Hydroelectric facilities: When natural condition river temperatures are greater than 20°C (July and August), load allocations have been set equivalently at 0.12°C above the natural temperature condition for the Box Canyon and Boundary facilities due to the inter-relationship of the temperature impacts and the associated cumulative impacts in the watershed. The temperature reduction required to achieve the load allocations for Box Canyon and Boundary is 1.13°C and 0.76°C, respectively, based on 2004 results. These reductions apply during July and August in the forebays of the dams, which are the areas of maximum temperature impairment.

Table ES-2. Pend Oreille River reaches and their compliance with Parts 1 and 2 of the Washington State temperature Criteria.

Criteria	Reach	River Mile Segment	Criteria Met		Level of Criteria Exceedance (°C)*	
			2004	2005	2004	2005
Part 1– Washington State Pend Oreille River Temperature Criteria	Newport	88.0 - 84.4	Yes	Yes	==	==
	Dalkena	84.3 – 77.0	Yes	Yes	==	==
	Skookum	76.8 – 72.4	No	No	0.21°C	0.20°C
	Kalispel	72.3 – 63.7	Yes	Yes	==	==
	Middle	63.6 – 56.1	Yes	Yes	==	==
	Blueslide	56.0 – 47.7	Yes	Yes	==	==
	Tiger	47.6 – 36.4	No	No	0.44°C	0.51°C
	Box Canyon Forebay	36.2 – 34.6	No	No	0.95°C	0.93°C
	Metaline	34.4 – 27.1	No	No	0.58°C	0.17°C
	Slate	26.9 – 19.6	No	No	0.45°C	0.19°C
	Boundary Forebay	19.5 – 17.1	No	No	0.70°C	0.47°C
	Boundary Tailrace	16.8 – 16.2	No	No	0.53°C	0.27°C
Part 2– Washington State Pend Oreille River Temperature Criteria	Newport	88.0 - 84.4	Yes	Yes	==	==
	Dalkena	84.3 – 77.0	Yes	Yes	==	==
	Skookum	76.8 – 72.4	Yes	Yes	==	==
	Kalispel	72.3 – 63.7	Yes	Yes	==	==
	Middle	63.6 – 56.1	Yes	Yes	==	==
	Blueslide	56.0 – 47.7	Yes	Yes	==	==
	Tiger	47.6 – 36.4	Yes	Yes	==	==
	Box Canyon Forebay	36.2 – 34.6	Yes	Yes	==	==
	Metaline	34.4 – 27.1	No	No	0.14°C	==
	Slate	26.9 – 19.6	No	No	0.24°C	==
	Boundary Forebay	19.5 – 17.1	No	No	0.61°C	==
	Boundary Tailrace	16.8 – 16.2	No	No	0.53°C	==

* The level of exceedence listed, for each reach, indicates the temperature extension beyond the relevant criteria; 0.3°C for part 1 and the allowable temperature increase for part 2.

The allocations are set for the forebays of each facility as opposed to each reach, because the temperature impacts identified in all of the reaches can be associated with operations of the facilities. To achieve water quality standards in the forebays, Ecology anticipates that actions will need to be taken throughout the reservoirs and in the tributaries.

When river temperatures are under 20°C in late summer and early fall (September through October), the Pend Oreille River exceeded the temperature criteria for each of the Boundary reaches to varying levels. To achieve criteria during September and October, the level of temperature reduction required for the reaches are:

Metaline: 0.14°C Slate: 0.24°C Boundary forebay: 0.61°C Boundary tailrace: 0.53°C

Point source discharges: NPDES point source discharges were not found to cause any significant shift in river temperatures. In addition, during the summer critical period temperature data from the point sources show that temperature increases at their mixing zone boundary were below 0.3°C.

Tributary and mainstem shading: Temperatures will be reduced in Pend Oreille River tributaries and along the mainstem through the establishment of potential natural vegetation conditions. Providing optimal riparian shade conditions to reduce peak temperatures will further increase the extent of viable habitat augmenting the river's designated uses.

Reserve capacity: The remainder of the 0.3°C load capacity when natural temperatures are above 20°C is 0.06°C (0.24°C was split among the dams), which has been set aside as a reserve. Ecology established this reserve to account for future economic growth associated with the expansion of public and private enterprise. Any future NPDES discharges to the Pend Oreille River in Washington will be allocated a portion of this reserve capacity. No reserve capacity is allocated to nonpoint sources or to the dams.

Planning and implementation to achieve criteria

The Pend Oreille Public Utility District (PUD) and Seattle City Light own and operate Box Canyon Dam and Boundary Dam, respectively. As part of their Federal Energy Regulatory Commission (FERC) license, these utilities will complete actions in their 401 Water Quality Certifications to achieve the temperature criteria for the Pend Oreille River. Specifically, Seattle City Light and the Pend Oreille PUD will follow the dam compliance schedule outlined in the state water quality standards [WAC 173-201A-510(5)]. In addition, Pend Oreille River watershed residents and landowners are called upon to reduce water temperature by increasing the number of native trees and shrubs along the Pend Oreille River and its tributaries.

In addition, seven facilities have National Pollutant Discharge Elimination System permits to discharge to surface waters. However, only four facilities (the town of Ione, city of Newport, Ponderay Newsprint and the Pend Oreille Mine) discharge when the river temperatures exceed 20°C. All seven facilities will be required to monitor temperatures, and the four facilities will have temperature limits placed in their permits.

Since the Tribe is affected by this TMDL, Ecology will work with those listed previously as well as Pend Oreille County to ensure that the Tribe's temperature criteria are met for their waters.

Why this matters

Reducing Pend Oreille River temperatures is important to protect the native salmonids and migrating bull trout that use the river. Salmonids' ability to feed, grow, reproduce, resist disease, compete with other fish, and avoid predators is negatively affected if water temperatures are too warm1. Actions to reduce water temperatures are necessary to ensure survival of bull trout, a threatened fish under the Endangered Species Act.

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[1]EPA. 2001. Technical Synthesis: Scientific issues relating to temperature criteria for Salmon, Trout, and Char Native to the Pacific Northwest. U.S. Environmental Protection Agency. EPA 910-R-01-007

Pend Oreille River Shoreline Stabilization Phase III
Draft Environmental Assessment

Albeni Falls Dam
Priest River Wildlife Management Area, Bonner County, Idaho

Seattle District
Corps of Engineers

July 2015

PEND ORIELLE RIVER SHORELINE STABILIZATION, Phase III
Draft ENVIRONMENTAL ASSESSMENT

EXECUTIVE SUMMARY

RESPONSIBLE AGENCIES: The responsible agency for this shoreline stabilization project is the U.S. Army Corps of Engineers, Seattle District.

ABSTRACT:

This Environmental Assessment (EA) evaluates the environmental effects of the proposed shoreline stabilization along the Pend Oreille River upstream of Albeni Falls Dam, near Priest River, Idaho. Scattered tracts of federal land administered by the US Army Corps of Engineers and located along the Pend Oreille River have been licensed to the Idaho Department of Fish and Game (IDFG) for management due to the valuable fish and wildlife habitat they encompass. Erosion from wave action has caused incremental bank failure along the north shore of the Pend Oreille River within the boundaries of an archeological site, which are also part of the IDFG wildlife management areas. Operation of the Albeni Falls Dam project is having an adverse effect on the National Register-eligible sites, as year round reservoir operations continue to cause shoreline erosion that results in a loss of important archaeological data that contributes to the understanding of the prehistory of the area and the cultural history of several Native American tribes. The erosion and bank failure has progressed within approximately 100 lineal feet of the Burlington Northern Santa Fe Railroad. This will lead to the potential interruption of a mainline railroad if the erosion is not stopped at its current location. Phase I of this project was completed in 2006, and Phase II was completed in 2007.

The proposed project will not constitute a major federal action significantly affected the quality of the human environment.

THE OFFICIAL 30-DAY COMMENT PERIOD ON THIS ENVIRONMENTAL ASSESSMENT IS: JULY 30 TO AUGUST 31, 2015.

This document is also available on line at:
http://www.nws.usace.army.mil/Missions/Environmental/EnvironmentalDocuments/2015EnvironmentalDocuments.aspx

Please send questions and requests for additional information to:

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4 EXISTING ENVIRONMENT

The following two chapters focus on those resources specific to the proposed project area that has the potential to be affected by activities connected with the proposed shoreline stabilization project. An environmental effect, or impact, is defined as a modification in the existing environment brought about by mission and support activities. These impacts are described as direct or indirect. Council on Environmental Quality (CEQ) guidelines 40 CFR 1508.8 describes direct impacts as those which are caused by the action and occur at the same time and place. The CEQ regulations define indirect impacts as those that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect impacts may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. Cumulative impacts are those that result from the incremental impacts of an action added to other past, present, and reasonably foreseeable actions, regardless of who is responsible for such actions.

The following resources were not studied in detail as existing conditions and the project alternatives would not have direct, indirect, or cumulative effects on the resources:

Climate: The Priest River project area lies in the Purcell Trench, a deep, glacial carved, U-shaped valley separating the Cabinet, Selkirk, and Cœur d'Alene mountain ranges. The area has a typical Pacific Northwest climate consisting of cool, wet springs and autumns; dry moderate summers; and cool, relatively long winters with alternating periods of severe and moderate temperatures. In lower elevations, the normal growing season occurs from late April or May through September. At Sandpoint, Idaho, July is the warmest month with an average daily temperature of 65°F (18.3° C). January is the coldest month, with an average daily temperature of 26° (-3.3°C). Average annual precipitation is approximately 30.5 inches (77.5 cm) for the overall basin. Most precipitation occurs as snow from November to March, but heavy snowstorms can occur in the higher elevations as early as mid-September or as late as mid-May.

Land Use: Idaho Department of Fish and Game manages the site as well as others around the Pend Oreille River, for conservation, maintenance, and management of wildlife, wildlife resources, and habitat. The public uses the area for recreational activities including fishing and observing wildlife. Public access to the area would be closed during construction for safety reasons. Once construction is completed, public access would resume.

Air Quality and Noise: Bonner County, Idaho is currently listed as in attainment for Air Quality standards set forth by Idaho Department of Environmental Quality (IDEQ, 2014). No known noise problems exist in the area. The operation of heavy equipment associated with the project would temporarily increase air emissions, including greenhouse gases, and noise in the immediate project vicinity. These increases would be minor in scope, temporary in duration, and are not expected to result in significant impacts. The total volatile organic compound emissions for this project during construction were also anticipated to be well below the *de minimis* level of 100 tons per year.

Utilities and Public Service: There was an easement for a buried waterline for an adjacent property owner on the western end of the project area. There are no known additional utilities at the proposed project site. The rail line will remain active during construction. Coordination with the POVA will help to minimize impacts to their operations.

Socioeconomic: The project site is located near the town of Priest River, Idaho. The immediate area is located within the Priest River WMA, which is used recreationally for hunting, fishing, and wildlife viewing. Bonner County's population is estimated at 40,456 with 96.2 percent white persons, and approximately 16.3 percent of the population below the federal poverty level (US Census Bureau, 2012). The economy has shifted from a reliance on the timber industry to a mixture of tourism, manufacturing, retail, and services (Idaho Dept. of Labor, 2014).

4.1 Hydrology and Geology

The Pend Oreille River at AFD has a watershed of 24,200 square miles, which supplies a mean discharge of 25,930 cubic feet per second. Lake Pend Oreille is a natural lake that is located in the glacially scoured basin in the Purcell Trench in northern Idaho, making it one of the deepest and largest lakes in the western United States. The Clark Fork River, emptying into the northeast corner of the lake, is its single largest tributary, contributing about 85 percent of the input. The Pend Oreille River begins at the outflow of Lake Pend Oreille near Sandpoint, ID. Conditions in Lake Pend Oreille and the Pend Oreille River, such as the stage of the reservoir and timing of the inflow, are influenced not only by AFD, but also by the operation of upstream projects and basin hydrologic factors. AFD operations target the following schedule:

- **Fall storage drawdown and Lake stabilization period.** The lake is drafted beginning in early September, targeting an elevation of generally 2051 or 2055 feet above mean sea level. This is called the minimum control elevation (MCE). The MCE is determined in the fall of each year based on a combination of factors to support kokanee salmon spawning habitat. During September the target draft is to reach the MCE by mid-November. The November objective is to stabilize the lake within a 0.5 foot range of the MCE to support kokanee spawning, and to prepare for the winter flood season and draft for power in the fall and winter. Throughout December the lake level is managed to avoid dewatering kokanee redds (gravel nests); kokanee are a key prey source for Endangered Species Act (ESA) listed bull trout. These operations also support flows for ESA listed salmonids in the lower Columbia River, particularly chum salmon.
- **Winter holding period.** During the winter holding season, (from approximately January to March) the lake level is held to no lower than the MCE. Lake storage above the MCE may be used for occasional flood management or hydropower operations without resetting the MCE, but storage above elevation 2056 feet must be evacuated by April 1 for flood management.
- **April through June flood season.** During the spring flood season (from approximately April through June) the objective is to manage runoff for flood risk management. The project will frequently operate on "free flow" to pass as much water as possible through the project to help minimize flood elevations on Lake Pend Oreille. AFD operations during this time also support flows in the lower Columbia River for ESA listed salmon. The lake is generally held at 2056 feet for flood storage but may be raised to manage floods. After the spring flood risk is passed, operations begin to refill the lake to reach the summer target elevation of between 2062 and 2062.5 feet. About every 10 years on

average, the lake is raised to 2062.5 feet earlier than normal as a result of flood management. Large floods may result in lake elevations greater than 2062.5 feet.

- **Summer conservation period**. During the summer, the lake elevation is held between 2062 and 2062.5 feet starting from the end of the spring runoff (June or early July depending on stream flows) until mid-September. The objective is to maintain a lake level to support recreational uses.

The shoreline is characterized by shallow water at summer pool and is exposed and dry during most of the winter drawdown period. As the water level of Lake Pend Oreille fluctuates between summer elevations at 2062 feet and winter elevations at 2051 to 2056 feet above mean sea level, soils that are normally not subjected to long-duration flooding are being inundated for many weeks. The soils in this area are mapped by the Natural Resources Conservation Service (NRCS) as Wrencoe silty clay, which are found in flood plains and stream terraces and are considered very poorly drained (NRCS, 2013). These soils have low cohesion and are easily eroded. Saturation weakens soil structure and kills vegetation that would help stabilize the bank. Bare banks during the lengthy high summer elevation are attacked directly by wake- and wind-generated waves, and by undercutting the sediment column with subsequent collapse of the overlying strata. Site soils are also affected by erosion within pipes created by burrowing animals. Both overland flow and hydraulic overpressure from wave action at the pipe entrance in the pool are leading to fairly rapid sediment loss.

As discussed in the 2011 *AFD Flexible Winter Power Operations EA*, shoreline erosion was expected to increase with lake levels cycling between 2051 feet and 2056 feet up to three times each winter. This increase would be an extension of existing processes related to soil sloughing and piping from the repeated wetting and drying of sediments caused by the water level variation and associated freeze-thaw effects (US Army Corps of Engineers and Bonneville Power Administration, 2011). To date, flexible winter power operations have not occurred.

4.2 Water Resources and Water Quality

The Pend Oreille River is part of the Pend Oreille/Clark Fork Watershed. The Clark Fork and its tributaries drain the Rocky Mountains in western Montana and northern Idaho. The Clark Fork empties into Lake Pend Oreille and the Pend Oreille River begins at the outlet of the lake. Albeni Falls Dam occurs along the Pend Oreille River at river mile (RM) 90, approximately 25 miles downstream from the lake.

The Pend Oreille River is listed for temperatures on Idaho's 2010 303(d) list of impaired waters (IDEQ, 2010). Water quality data from the Pend Oreille River shows that water temperature exceeds the site-specific criterion of 20°C from the state water quality standards. In addition to Idaho, the entire Pend Oreille River in Washington is also considered impaired for temperature. High water temperatures limit bull trout distribution in general, and spawning and rearing are extremely limited due to high summer temperatures above the thermal tolerance for bull trout. However, bull trout from the Priest River use it as a migration corridor in the fall and spring to migrate to and from Lake Pend Oreille.

Sediment flow is another pollutant of concern in the upper Pend Oreille basin. Localized turbidity during the summer pool levels is evident between Lake Pend Oreille and Albeni Falls

Dam. The proposed project area contributes to localized turbidity due to wave erosion and sloughing of unconsolidated shoreline materials.

4.3 Vegetation and Wetlands

Most of the area that comprises the approximately 3,700 feet of shoreline and associated riparian corridor consists of scattered Ponderosa pine (*Pinus ponderosa*), with a dense undergrowth comprised of black hawthorn (*Crataegus douglasii*), serviceberry (*Amelanchier alnifolia*), and snowberry (*Symphoricarpos albus*). Ground cover is comprised of common uplands grasses with the primary species consisting of reed canarygrass (*Phalaris arundinacea)* and forbs including an invasive species, spotted knapweed (*Centaurea maculosa*).

A palustrine emergent wetland contiguous with the Pend Oreille River occurs adjacent to the project area (Figure 4). The wetland is dominated by cattail (T*ypha latifolia)* with sub-dominant native sedges (*Carex* spp., *Scirpus* spp.) and rushes (*Juncus* spp.) The perimeter of the wetland is dominated by willows (Salix spp.) and red-osier dogwood (*Cornus sericia*).

Figure 4. Wetlands adjacent to shoreline stabilization projects

4.4 Fish and Wildlife

4.4.1 Fish

Lake Pend Oreille and the Pend Oreille River are home to a variety of native and non-native fish. Cold water species tend to occupy the deeper waters of the lake while the warm water species are more prevalent in the near-shore areas and the river between Sandpoint and the AFD. Prevalent species include kokanee (*Oncorhynchus nerka*), bull trout (*Salvelinus confluentus*), rainbow trout (*O. mykiss*), cutthroat trout (*O. clarkii*), bass (*Micropterus spp.*), whitefish (*Prosopium spp.*), perch (*Perca spp.*), and sunfish (*Lepomis spp.*). The significant sport fishery targets trout in the cooler waters and bass in the warmer. In the lake proper, the kokanee fishery had been closed in the past due to the decline in populations. However, with an ongoing increase in population, current regulations allow for a total of 15 fish per day. No spawning and creation of redds is known to occur within the footprint of the proposed action most likely due to the clay substrate instead of a preferred gravel substrate.

4.4.2 Wildlife

The upper Pend Oreille area supports a variety of wildlife species that contribute to recreational opportunities including viewing, hunting, and trapping. The most sought-after game species include white-tailed deer (*Odocoileus virginianus*), elk (*Cervus elaphus*), black bear (*Ursus americanus*), and mountain lion (*Felis concolor*).

In the vicinity of the proposed project site, state and federal agencies intensively monitor waterfowl for their importance to hunting as a recreational activity. The number of ducks can range from 47,500 to as high as 142,600 in the Pend Oreille Lake and River basin. While most of the 23 species of waterfowl recorded are migrants or winter residents, several resident species of ducks and Canada geese nest and rear their young around the shorelines of the lake and river. Mallards, three species of teal, wigeons, coots, and pied-billed grebes are among the many species reported to nest along the shoreline and/or in adjacent marshes.

Birds of prey such as hawks, owls, and bald eagles (*Haliaeetus leucocephalus*) are associated with the Pend Oreille riparian areas. Bald eagles have been nesting along the river for as long as recorded history goes back, with the closest active nest being approximately 600 ft away on the eastern end of the project area in some trees to the north of Highway 2. Ospreys (*Pandion haliaeutus*) migrate into area from mid-March through October. The osprey population Idaho and the northeastern Washington constitute the largest nesting concentration in the western states and there are multiple nests along the river, many on man-made nest poles.

4.5 Threatened and Endangered Species

Bonner County has three listed species protected under the 1973 Endangered Species Act (ESA), as amended, potentially occurring in the project area. The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) West Coast Region web sites (USFWS, 2015) (NMFS, 2015) consulted in June 2015 to determine which species under their respective jurisdictions could occur in the project area. In accordance with ESA Section 7(a)(2) federally funded, constructed, permitted, or licensed project must take into consideration impacts to federally listed and proposed threatened or endangered species (Table 1).

Table 1. Protected species potentially occurring in the project area

Species	Listing Status	Critical Habitat
Bull trout (*Salvelinus confluentus*)	Threatened	Designated
Lynx, Canada (*Lynx canadensis*)	Threatened	Designated – not in project area
Caribou, woodland (*Rangifer tarandus caribou*)	Endangered	Designated – not in project area

4.5.1 Bull trout (*Salvelinus confluentus*)

Bull Trout spawning and rearing habitat below Lake Pend Oreille is extremely limited due to high summer temperatures that are above the thermal tolerance for the fish. However, bull trout from the Priest River do use it as a migration corridor in the fall and spring to migrate to and from Lake Pend Oreille. Therefore, there is a probability that bull trout could utilize the areas that surround the project. Due to the clay substrate in the project area, they are not expected to utilize the area for spawning or creating redds.

4.5.2 Canada lynx (*Lynx canadensis*)

The distribution of lynx in Idaho is closely associated with the distribution of boreal forest and sub-alpine forests. Within these general forest types, lynx are most likely to persist in areas that receive deep snow and have high-density populations of snowshoe hares, the principal prey of lynx. Because of this habitat preference, they are not expected to be found in the project area.

4.5.3 Woodland caribou (*Rangifer tarandus caribou*)

Historically woodland caribou inhabited the forests of the northern United States from Maine to Washington State, but have been reduced to one small herd in the Selkirk Mountains of northern Idaho, eastern Washington and southern British Columbia. Caribou are generally found above 4000 ft elevation in Engelmann spruce/sub-alpine fir and western red cedar/western hemlock forest types. The Selkirk herd is reduced to approximately 25 to 30 animals that tend to stay mostly in the Canadian part of its range; therefore caribou are not expected to be found in the project area.

4.6 Cultural Resources

Cultural resources are locations on the physical landscape of past human activity, occupation, or use and typically include archaeological sites such as lithic scatters, villages, procurement areas, resource extractions sites, rock shelters, rock art, shell middens; and historic era sites such as trash scatters, homesteads, railroads, ranches, logging camps, and any structures or buildings that are over 50 years old. Cultural resources include traditional cultural properties, which are aspects of the landscape that are a part of traditional lifeways and practices and are considered important to a community.

Two National Register- eligible archaeological sites (10-BR-94 and 10-BR-95) are located within the project area. Both sites were first recorded in 1977 by Corps archaeologists. Subsequent investigations in 1979 and 2000 have uncovered lithic, faunal and botanical remains at each of the sites. In addition, there is evidence of pre-and post Mazama occupation at each site. Both sites are contributing elements to the Upper Pend Oreille Archaeological District and are individually eligible to the National Register. Site 10-BR-94 is eligible to the National Register under Criteria D for its potential to yield additional information important to prehistory of the region. Idaho State Historic Preservation Office (SHPO) concurred that 10-BR-94 was eligible on January 16, 2006. Site 10-BR-95 is individually eligible to the National Register under Criteria B for its association with K̇ʷil’tė, the older brother to Chief Victor, the headman and chief of the nlx̣ʷlox̣ʷ band, who typically wintered in the vicinity of CCA creek’s confluence with the Pend Oreille River at river mile 65.2 and Criteria D for its potential to yield additional information important to prehistory of the region. Idaho SHPO concurred on June 5, 2015.

Two previous bank stabilization projects occurred at site 10-BR-94 in 2006 and 2007 to protect the site from on-going adverse effects of erosion. Ground penetrating radar (GPR) survey was conducted in March 2015 along the beach frontage of site 10-BR-95. The results of the GPR survey indicate three areas positive for subsurface deposits. In addition, to the GPR survey the preferred staging area along U.S. 2 was examined and no evidence of archaeological sites was observed. As part of the 2006 work shovel testing occurred on the access route leading from the high ground to the beach. It was determined that while the access road is a part of 10-BR-94 there would be no adverse effect to the site if the road was constructed by laying down cloth and installing a gravel pad resistant to penetration by vehicle traffic.

4.7 Transportation

Road access to the project area is via a two lane Federal highway, US Highway 2 (Albeni Road). The Idaho Department of Transportation (IDOT) does not have any construction projects planned for US Highway 2 according to their 5-year transportation plan (IDOT, 2013).

The POVA railroad operates the short-track rail line adjacent project area under lease from the BNSF railroad. The POVA train normally operates one round-trip, three days a week to serve the shipping needs of local industries. Normally scheduled freight operations are Monday through Friday from 6 AM to 6 PM with an occasional weekend or evening run to meet the needs of shippers or sight-seeing/tour trains. Trains on the route are low speed, operating less than 25 mph.

4.8 Aesthetics and Visual Resources

The hillsides around the Pend Oreille River are forested with evergreens. Small pockets of residential developments and farms are visible near the shoreline of the river. Also in the viewshed are the highway and the POVA railroad. The proposed project area has the appearance of a shoreline without development that is in a state of constant erosion. Grasses and shrubs are constantly sloughing off, and turbidity is nearly constant at high pool. The remaining upland riparian area between the toe of the railroad bed and the river is threatened if erosion is not curtailed.

4.9 Recreation

Recreation is an important industry for the local and county governments. Fishing, boating, skiing, hunting, camping, bird watching, and train viewing are common recreational activities in Bonner County. The mainline BNSF railroad through Sandpoint has 50 trains per day, which attracts train aficionados from across the country. The Pend Oreille Lake and River host many water activities such as swimming and water skiing. A popular sailing and rowing regatta takes place each year in September. West Bonner County Park is located east of the Town of Priest River on the north shore of the Pend Oreille River and provides a public access boat ramp. The public uses the shoreline area that is being protected by Phase I and II for recreation, hunting, and bird watching.

as minority or low-income population. A query of the US Census Bureau[2] indicated that Bonner County contained a 95.9 percent Caucasian population, and that 15.2 percent of the County's population had income below the poverty level.

The project does not involve siting a facility that would discharge pollutants or contaminants, so no human health effects will occur. Maintenance of the proposed erosion control structures will not affect property values in the area, nor would it socially stigmatize local residents or businesses in any way. The project would not interfere with local Native American Nations' treaty rights, and construction activities will not disrupt access to usual and accustomed fishing grounds. Since no adverse human health or environmental effects are anticipated to result from the project, the Corps has determined that no disproportional adverse human health impacts to low-income or minority populations will occur.

9.9 Executive Order 119901, Protection of Wetlands

Executive Order 11990 encourages federal agencies to take actions to minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands when undertaking federal activities and programs. The bankline stabilization project has drainage breaks in the design to allow known permanent and intermittent streams to discharge into the Pend Oreille River. Approximately 1.22 acres of riverbed mud flats/emergent wetlands would be filled as a result of the project. Approximately 0.14 acres of mud flats/emergent wetlands would be temporarily affected during the construction of the project. To mitigate this loss, soil and native plantings would be incorporated into the rocky bank stabilization structure design. Over time, this additional native fringe vegetation would improve habitat and may discourage weedy herbaceous growth.

10 SUMMARY / CONCLUSION

The following table summarizes the potential effects to the environment of the proposed project alternatives:

Table 3. Summary table to compare potential effects of alternatives

Resource	No Action Alternative	Proposed Project Alternative
Hydrology	Existing conditions are expected to continue.	Restriction in natural channel movement, reduction of channel complexity, and decreased sinuosity
Geology	Continued erosion of the shoreline.	3,700 feet of shoreline would be stabilized with Class II riprap or smaller diameter spall rock to a depth of about three feet.
Water Resources and Water Quality	Localized turbidity due to wave erosion and sloughing of unconsolidated shoreline materials.	Decrease in localized turbidity as the shoreline would be stabilized with rocks.

[2] US Census Bureau Quickfacts for Bonner County, Idaho. *http://quickfacts.census.gov/qfd/states/16/16017.html*

Resource	No Action Alternative	Proposed Project Alternative
Vegetation and Wetlands	Slow loss of riparian vegetation as the shoreline erodes	Loss of 1.22 acres of mudflat habitat. Temporary effects on 0.14 acres of frozen mud flat/emergent wetlands. Temporary effects to vegetation along trails and roadsides when vegetation is cleared to improve access. These areas would be reseeded once work is complete.
Fish and Wildlife	Potential loss of kokanee salmon spawning habitat. Continued loss of riparian habitat as the shoreline erodes.	Temporary disruption to local birds in the area due to noise of construction activities. Further loss of riparian habitat would be prevented.
Threatened and Endangered Species	No effect	**No effect** to Canada lynx and woodland caribou or their designated critical habitats. **May affect but not likely to adversely affect** bull trout or its designated critical habitat.
Cultural Resources	Continued erosion of National Register eligible archaeological sites 10-BR-94 and 10-BR-95.	Sites 10-BR-94 and 10-BR-95 would be protected from further erosion which is considered an adverse effect.
Transportation	Existing conditions are expected to continue	Temporary disruption of local and tourist traffic by construction vehicles
Aesthetics and Visual Resources	Existing conditions are expected to continue	The appearance will change from a muddy sloughing shoreline to a rocky bankine, topped with vegetation.
Recreation	Slow loss of land based activities as the bankline erodes.	Slight benefit to the recreational user due to improvements to the trail and rocky bankline.

Based on this Environmental Assessment and on coordination with Federal agencies, a Native American Tribe, and State Agencies, stabilization of the shoreline in the vicinity of the Priest River outlet on the Pend Oreille River is not expected to result in significant adverse environmental impacts. The Priest River Shoreline Stabilization Project is not considered a major Federal action having a significant impact on the human environment. Therefore, the preparation of an environmental impact statement is not required. A signed finding of no significant impact (FONSI) will complete this environmental review.

IDAHO DEPARTMENT OF FISH AND GAME
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Dear Agency Representatives:

REFERENCE: Joint Application for Permit NWW-2007-01303, BNSF Sandpoint Junction Connector

We have reviewed the application by Burlington Northern Santa Fe Railway Company (BNSF) to construct an over-water rail bridge across Lake Pend Oreille (LPO) and Sand Creek in Bonner County, Idaho. The purpose of these comments is to assist the decision-making authority by providing technical information addressing potential effects on wildlife and wildlife habitat and how any adverse effects might be mitigated. It is not the purpose of Idaho Department of Fish and Game to support or oppose this proposal.

BNSF is proposing a new mainline track 50' west of the existing track over Lake Pend Oreille to meet rising rail traffic volumes. Specifically, two permanent bridges are proposed: Bridge 3.9 is the proposed over LPO and Bridge 3.1 over Sand Creek, totaling 2.2 miles of new bridges. A temporary work bridge will be built parallel and west of the permanent bridges, which will more than double the amount of overwater structure and pile driving needed to complete the project.

Resident species of fish and wildlife are property of all Idaho citizens and the Department is expressly charged with statutory responsibility to preserve, protect, perpetuate, and manage all fish and wildlife in Idaho. The applicants do not address the potential impacts to state-managed species and our stakeholders, including the multi-million dollar Lake Pend Oreille (LPO) sport fishery, a major biological and cultural staple of northern Idaho. This fishery is estimated to provide $13-17 million dollars annually to the state and local economy (IDFG 2012, 2003). Focusing minimization and mitigation measures solely on bull trout and 0.28 acres of wetland ignores important economic, ecological, and cultural fish and wildlife resources at risk due to the construction and operation of the proposed bridges.

The applicant's mitigation plan (Item 18) acknowledges that 1.26 acres of nearshore fill (0.38 temporary, 0.88 permanent) is not accounted for. BNSF proposed that this mitigation is contingent upon the following: "regulatory agencies are in agreement and can provide direction for calculating the functional units of impacted nearshore waters." This caveat is complex and requires facilitation and adequate time for consensus. Conversations between IDFG and the Agent have been limited. The language suggesting discussions to resolve this project component are in progress is misleading, at best. IDFG will be happy to meet with BNSF and other agencies to work to find resolution for this aspect of the project, but we recommend postponing approval until a nearshore mitigation plan is complete. In-kind mitigation for this open water habitat type would be difficult to replicate solely with wetland bank credits.

The project area is a transition zone between lake and riverine environments. We expect primarily warmwater fish species to reside year-round in the project area, with native salmonids migrating through. IDFG and Avista gillnet sampling in spring 2015 and fall 2017 was completed in the littoral zone near both the northern and southern ends of the existing bridge. These surveys found a mixed bag of fish species including cutthroat trout, kokanee, lake whitefish, rainbow trout, northern pikeminnow, peamouth, black crappie, brown bullhead, largescale sucker, smallmouth bass, tench, walleye, and yellow perch (R. Ryan, IDFG, personal communication). Kokanee are not known to spawn in this area. Salmonid migrations through the project area have been documented for bull trout (Dupont et al. 2007) and westslope cutthroat trout (J. Conner, Kalispel Tribe of Indians Fisheries Management Program, unpublished data).

Wildlife species documented in the project area include birds and amphibians, primarily in Sand Creek slough. Birds, particularly waterfowl and bald eagles, consistently use this area as foraging and resting habitat. Species of Greatest Conservation Need (SGCN) identified in the action area include western grebe and ring-billed gull. Freshwater mussels have not been inventoried in the project area yet but are particularly susceptible to benthic disturbance and increased turbidity. Western ridged mussel is an SGCN that may occur in the project area.

Temporary effects due to construction

The direct, temporary effects due to construction are primarily associated with pile driving and work bridge construction. Noise and turbidity are the two primary disturbances which may affect bull trout according to the Biological Assessment (BA). The BA concludes impacts to bull trout due to noise will be minimal because a) the use of bubble curtains will reduce decibel levels and b) bull trout migrate at night when work will not take place. Bubble curtains will reduce noise however sound exposure levels are still predicted to exceed bull trout thresholds for both injury and behavioral effects. Lighting impacts are not addressed in the BA, which may attract predators or discourage movement of bull trout. While bull trout may exhibit nocturnal movements, other species of fish may be more active during the day. Fish avoidance of the aquatic action area may have indirect effects on birds protected on the Migratory Bird Treaty Protection Act and Bald Eagle Protection Act.

Turbidity impacts during pile driving will be minimized with turbidity curtains. Turbidity impacts following piling removal are not addressed. LPO is designated as mercury impaired (Essig & Kosterman 2008). Lakebed disturbance will increase benthic flux, resuspending pollutants currently bound in anoxic sediments and potentially affecting mercury bioavailability. Risk of heavy metal resuspension may warrant sediment core analysis or additional water quality sampling. The benthic community has not been assessed and therefore disturbance impacts will go undocumented and unmitigated if the application is approved as-is.

One minimization measure is the use of bubble curtains for Bridge 3.9 (288 piles) to reduce noise levels from pile driving. The application does not identify whether bubble curtains will be used to install the temporary work bridge (700 piles). We recommend the final application include this condition to protect bull trout and other fish species. Additionally, bubble curtains are not proposed for the Sand Creek Bridge (3.1). Due to shallow water and warm temperatures, Sand Creek is not considered optimal bull trout habitat. Nevertheless, Bridge 3.1 is in federally designated critical habitat and bull trout may be present, particularly in spring when water levels are up and spring runoff cools this area. Other fish and wildlife are present year-round and may be affected by piling driving. Westslope cutthroat trout have been documented in Sand Creek and adfluvial adults would be most likely to move through this area during spring. Avoiding work during spring, maintaining aquatic passage, and using bubble curtains are all minimization options that would help protect these state-managed species.

Lost fishing opportunity through construction closures and fish avoidance of the aquatic action area is not addressed. Construction is proposed to last approximately three years. A recent creel census identified over 190,000 angler hours spent on LPO from spring 2014-2015 (Bouwens 2016). Creel data is not at a fine enough resolution to recommend timing and access considerations for our fishing and boating stakeholders. Angler concerns identified in public scoping process will help identify site-specific avoidance and minimization measures appropriate for protecting this cultural resource.

Construction equipment working in and around the water not only has the potential to release hazardous chemicals and debris, there is also the potential for introduction of aquatic invasive species (AIS). Construction equipment from outside the basin working in and around the water would be considered a means of AIS conveyance. Idaho Department of Agriculture requires this equipment be properly decontaminated before entering the state. Any means of conveyance is subject to invasive species inspection stations (Idaho Statute §22-1908).

Direct, permanent effects

Increased shading and piers are likely to improve habitat for nonnative fish species such as bass, pike, and walleye. The bridge structure has the potential to increase predation not only on subadult bull trout but also cutthroat trout, kokanee, lake whitefish, and rainbow trout. While these salmonids may not permanently reside in the project area, movement between the Pend Oreille River/Priest River basins and lake overwintering habitat may be restricted due to the proposed project. Population-level effects on bull trout are discounted in the BA due to the current, robust size of this distinct population segment and the relative size of the action area. First, the number of subadults that migrate through this area has not been quantified therefore predation and connectivity impacts cannot be determined. Second, although the action area is small compared to the LPO critical habitat area, all fish moving between the Pend Oreille River and lake overwintering habitat must pass through this area to reach the lake. This includes bull trout that move from the East River in the Priest drainage to overwinter in LPO (Dupont et al. 2007). The East River population is relatively small and exhibits a unique life history, and would be expected to be more vulnerable than other spawning populations of bull trout in this area.

In addition to predatory impacts, nonnative fish can compete with adult bull trout for food. Walleye stomach content analysis in LPO has shown predation on kokanee, a key prey resource for adult bull trout. Creating more nonnative fish habitat creates a hotspot of predators and competitors to LPO's salmonid fisheries. Native fish habitat quality has been incrementally impacted by shoreline alterations (riprap, vegetation removal) and dock construction for similar reasons. The proposed project will add to the permanent, cumulative effects of bull trout and native fish habitat alteration in the Pend Oreille basin.

Indirect, permanent effects

The most concerning indirect effect due to this project is the heightened spill risk due to increased rail traffic across LPO. The Geographic Response Plan (GRP, NWAC 2017) highlights some of the vulnerabilities and equipment shortages in the region. The Bakken crude oil shipped across the lake has a high acute toxicity to biota and its low viscosity will equate to a rapid spread over the surface of the lake should a spill occur (NWAC 2015). The GRP identifies 7,360 ft. of curtain boom would be required to contain a spill at the existing rail bridge. Only 1,000 ft. of boom is cached in Sandpoint and additional trailers have no means for transport. Skimmers and vacuum trucks are not housed in the LPO region. Jet boat availability and boat ramp access is dependent on community resources and season. Furthermore, 12.9% of rail shipments in Bonner County are water soluble (NWAC 2017); spills of this type, including sulfuric acid and hydrochloric acid, could not be contained regardless of response time.

Adverse effects due to a spill are highly dependent on the volume and material spilled. As identified in the GRP, significant and devastating consequences to the public, local communities, and the environment are possible (NWAC 2017). Acute and chronic health impacts to fish and wildlife, habitat destruction, lost tourism dollars, and recreation opportunity are just a few of the potential effects of a spill on the resources the Department manages.

Recommendations

While BNSF evidently owns the lakebed below the action area, the species that rely on functional limnology of LPO are the property of the citizens of Idaho. Millions of dollars have been invested in the protection, perpetuation, and management of Lake Pend Oreille fish and wildlife resources. As the state management agency charged with stewardship for these resources, our objective is to work with project proponents to ensure that no net loss of fish or wildlife habitat or population viability occurs, and to ensure that opportunities for citizens to enjoy these resources are not lost or impaired.

At minimum, we recommend the following Best Management Practices during construction:

- Minimize nighttime lighting of construction area and new bridges
- Use bubble curtains on all pile driving, including work bridge and Bridge 3.1 installation
- Use turbidity curtains during piling removal as well as installation
- Decontaminate all equipment working in or around water to remove aquatic invasive species

The most significant impacts to fish and wildlife would occur with a hazardous material spill in LPO. Therefore, we recommend BNSF address all vulnerabilities in the rail bridge hazard zone and invest in spill equipment and training that will reduce response time, particularly between mid-October and mid-May. Based on other settlements across the country, remediation and mitigation for a significant hazardous material spill would be expected to cost BNSF more than additional preparedness measures, and some losses would likely be irreplaceable. Updated BNSF GRP information should specifically address how the vulnerabilities identified by the Northwest Area Council have been resolved.

As identified above, we recommend the application not be approved until a mitigation plan is finalized for the 1.26 acres of nearshore fill currently unaccounted for in the application (Item 18). We thank the Idaho

Department of Lands for extending their comment period and organizing two public hearings. We are willing to work with BNSF, regulatory agencies, and community partners to identify opportunities that address and mitigate both reduced ecosystem function and increased spill risk, with the objective of reaching solutions that maintain, replace, and/or restore impacted fish and wildlife habitat and populations.

Thank you for the opportunity to comment.

Sincerely,

Charles E. "Chip" Corsi
Regional Supervisor

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